ANNALS
OF
OTOLOGY, RHINOLOGY
AND
LARYNGOLOGY.

VOL. XXII. JUNE, 1913. No. 2.

XII.

REMOVAL OF ADENOIDS BY DIRECT INSPECTION.*

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After developing this method of operation for more than a year, I wish to present a brief and concise description, in order to place it on record, hoping that this procedure will so appeal to the operators who are engaged in this field of work that they will give it a trial.

It has always seemed to the writer that the removal of the adenoids, which is such an important operation to the well being of the individual, and so essential for the laryngologist to master, has been performed in an uncertain and unsatisfactory manner. Not that the operation as performed by the majority of men is not followed by good results, but that in a fair percentage of cases, even when performed by

*Read before the Middle Section of the American Laryngological, Rhinological and Otological Association, St. Louis, February 22, 1913.

the expert, it is followed by what is regarded as recurrences or remains. Especially is this true of that group of adenoid vegetations in the region of the eustachian tubes. The one great difficulty is the inability to see clearly this important region during the operation. While operating for the removal of an epipharyngeal fibroma on a patient who had a short time before had his tonsils removed, I discovered what a large field of the postnasal space was exposed by the method I am about to describe, and it was at that moment that I made up my mind to apply it as a routine in adenectomy.

Dr. E. Pynchon, of Chicago, some four years ago demonstrated to me the retraction of the soft palate by means of rubber tubing, for the purpose of doing my operation of obliteration of the pharyngeal end of the eustachian tube in connection with the cure of chronic suppuration of the middle ear (patulous tube after radical mastoid). I was not able to bring the ostium into very clear view, but I was enabled to employ a large laryngeal mirror and do the work very easily by the indirect method. (Fig. 6.) The great difference of exposure of this region after the tonsils (tonsillectomy) are removed is apparent from the comparison of the two illustrations. (Fig. 5 and Fig. 3.)

The technic of the operation is as follows: Pass the free ends of a rubber urethral catheter (the smaller sizes), one through either nostril, and withdraw them from the mouth, thus crossing the columella of the septum. Put a gauze sponge at this point to prevent too much pressure on the columella. Allow them to remain in this position while the tonsils are being removed, usually placing them to one side or the other out of the field of operation of the tonsillectomy. As soon as one tonsil is out, the end of the catheter corresponding to the side from which the tonsil was removed is drawn taut out of the mouth and over the cheek, while the other end is held. This will bring the pressure from behind forward against the hard palate, and thus stop the greater portion of the bleeding and enable one to do the opposite tonsillectomy with very little interference from bleeding of the tonsil removed. It will also bring the anterior and pos-

terior pillars in apposition, thus closing in the large cavity created by the tonsillectomy. If the bleeding is profuse, place a small gauze sponge between the two pillars and then by a fine rat-tooth forceps (Tuffier) hold them together, also taking in a small bit of the gauze so that it cannot fall out at the bottom. (Fig. 3.)

When both tonsils are excised and the bleeding perfectly controlled, the soft palate is allowed to recede, the two pillars liberated by the removal of the Tuffier forceps and the gauze sponge removed. The assistant then pulls both free ends of the catheter out over the cheeks, causing large exposure. (Fig. 3.) The head is now extended, and the region of the ostia, as well as the highest point of the vault of the pharynx, is seen. One must not look from the side to get the best view of the tubal ends, but straight towards the vault. With a large laryngeal mirror inspection is made of the posterior nares with the entire nasal contents, and the overriding of the adenoid mass into the posterior choanæ is noted. (Fig. 6.)

The mass is now palpated so as to determine the consistency and the amount of overriding. If the patient is not completely anesthetized, or his pharyngeal reflex not yet completely abolished, the examining finger gains the same impression as when examining the postnasal space of a conscious patient, namely: the constrictor muscle fold (Wulst) many times in the form of an incomplete ring. As long as that fold forms, the removal of the adenoids should be deferred and patient completely anesthetized, because this muscle fold may be cut and produce symptoms of stiffness of the neck to which Fein recently called attention, but did not explain on this basis.

The removal of the adenoid mass itself may be done by any method preferred by the operator; but the removal of the remaining portions, especially in Rosenmüller's fossa, should be performed with a straight ring curette, such as it is customary to employ in the curettage of the endometrium. It may be bent to suit any particular shape desired. The pronounced oozing that results from the removal of the central

mass is controlled by a gauze sponge mounted on a six-inch artery forceps, by exerting firm pressure for a few moments. This is particularly easy of execution, as the soft palate is drawn out of the way. If after removal of this sponge pressure the oozing does not cease, it may be checked by putting on from one to six artery forceps, grasping a small amount of the underlying soft fibrous tissue that is always present after the removal of the adenoids. (Fig. 4.) These are allowed to remain for a few minutes, or until the time the patient awakes from the anesthesia.

The instrument that I employ now for the removal of the main mass is an adenoid curette of the St. Clair-Thompson pattern, without a guard, and with the cutting edge formed into a wave blade. (Fig. 9.) The motion of the instrument in the removal of the mass is not in the usual rapid, sweeping movement of the elbow-wrist turn, but is from side to side and slow elbow-wrist turn. The mass is cut off and remains lying practically in situ; however, the last cut at the lower margin of the mass may require the use of a forceps to hold it. Shredding of the mucous membrane is not possible under these circumstances, nor it is possible to cut off any of the muscle fibers of the constrictor fold, as I have seen in the operation when done by feeling alone.

There are two other points in the operation that are, in my opinion, important, namely: the method of administration of the anesthetic, and the employment of suction to remove secretion and blood. I employ ether exclusively after having tried gas-oxygen for some time, as I find that the latter does not completely relax the pharyngeal muscles, which is necessary for the performance of tonsillectomy and more so for adenectomy, as will be shown later. To induce the anesthesia we employ what Prof. Rovsing of Sweden recommended: the rebreathing of ether by means of a somnoform apparatus. (Fig. 10.) About two ounces of ether is placed in the rubber bag, and after applying the mask firmly over the nose and mouth, the air valve is opened and the patient breathes air and a small amount of ether. When the air valve is partly closed, the ether vapor is increased until

finally the valve is entirely closed and the patient breathes pure ether. This he continues to do until finally a quantity of carbonic acid will form within the bag. This is called the rebreathing of ether, since the patient exhales some of the excess. The carbonic acid is considered of benefit to a certain degree in ether anesthesia. Whenever it accumulates to an excess, cyanosis is present; the air valve is opened and some air is allowed to enter. This method of induced anesthesia we have found to be the least irritating and most satisfactory, although it requires a little longer to induce anesthesia than by other methods. The induced anesthesia is then followed by the forced vapor method.

The apparatus illustrated (Fig. 11) shows an ether bottle attached to a pump, run by a small motor, whose speed can be regulated (the Victor transformer cautery apparatus). This vaporized ether is forced through a small tank (Cain McDermot) which contains wound within it tubing surrounded by thermolite. This tank is hermetically sealed, and when placed in hot water for about ten minutes heats up the thermolite; the latter holds the heat for some time. The ether which is passing through the heated tubes within this tank thus has its chill taken off and is easier of respiration, absorption and less irritating to the mucous membrane of the respiratory tract. From this tank pass the ether supply tube and its terminal mouthpiece. This latter acts also as a cheek retractor for better inspection. There is a suction bottle for the blood and mucus. From the pump, which has a double action of suction and pumping, a stiff rubber tube passes to the suction bottle, and connected with the latter is another piece of rubber tubing with a metal tube to be introduced into the throat, etc., whenever indicated. Suction is one of the greatest aids in the operation of tonsillectomy and adenectomy. Anyone having a motor may use the pump by obtaining the proper attachment.

In conclusion, I wish to say that in tonsillectomy, whatever method may be adopted, it is necessary that the operation be performed as rapidly as possible in order to utilize the pressure by the catheters to control bleeding. The opera-

tion as first suggested by Dr. Sluder, of St. Louis, or that one by Dr. J. Leslie Davis, of Philadelphia, is such as meets the occasion. The method that I recommend* and that I am able to use almost in every instance, is the one that gives me the best satisfaction in connection with this method of operating on the adenoids. I take the liberty of presenting two illustrations (Figs. 1 and 2) of my method of doing tonsillectomy without preliminary dissection, because the removal of the tonsils and adenoids, especially in children, is usually combined or performed at the same sitting.

I have not changed my technic of tonsillectomy from the one originally described, except in so far as it relates to this adenoid operation. I take exception to the criticism of Dr. Greenfield Sluder in the *Journal of the American Medical Association*, March 1, 1913. He states:

"In Beck's instrument the narrowing gap which is to do the cutting is a snare-wire loop, concealed and protected in the Vedder tip. As soon as the snare is pulled the loop is released from its rigid protector. It must then be trusted to follow in the connective tissue bed. Frequently it does follow nicely, especially if there are no adhesions between the capsule and the subjacent tissue. But should it not do so, the surgeon has not the power to tuck the tonsil into it, because he has nothing rigid to resist his pressure; the flexible wire bends with the tissues. He, therefore, has no rigid ring over which to pass the finger tip in forming his final judgment of when to cut. For these reasons the repair work which may frequently be necessary cannot be done, especially the removal of thin tough pieces, which is quite possible, usually, with the original model. A small finger tip is also a disadvantage for Beck's instrument. In other respects it is admirable, possessing the advantage of the slowly strangulating snare."

This can only occur when the operator is not entirely familiar with the technic. If once the tonsil is Sluderized (pushed through the ring of the tonsillectome) and the finger

*Tonsillectomy by Means of a Single Instrument, the Tonsillectome. Journal of the American Medical Association, June, 1912.

is pressed until the entire circumference of the ring is felt under the palatoglossus muscle, the wire is under constant control and will follow the contour of the tonsil and remove it in its entirety, with a smooth uninjured capsule and nothing else. Even the plicæ tonsillares, superior and inferior, remain, which is not always possible with the blade going from before backwards.

The one modification that I have made is to have a much smaller ring in cases of very flat tonsils and small tonsils of children, since a perfect operation depends on the entire cryptic surface of the tonsil being engaged in the ring.

I wish to illustrate a case of attempted removal of the adenoids, which evidently were only severed at one place and allowed to hang on and organize in the form of a polyp. (Figs. 7 and 8.) Such an accident could not occur if the operation had been performed, even by a novice, by direct inspection, as I have described.

Since writing the above, the author has been in personal communication with Dr. George L. Richards (Fall River, Massachusetts), who referred him to his paper as published in the Transactions of the American Laryngological Association, 1907, page 184, in which he stated his practice of using the palate retractor. In justice to Dr. Richards, his description is appended.

"In young adults and older children, I have used a palate retractor first suggested to me by Dr. J. E. Schadle of St. Paul, Minn. This consists of a piece of tape twenty-four inches long, the ends of which for six inches are twisted and then coated with paste and dried. One end is passed through each nostril to the nasopharynx, grasped with a forceps and drawn out through the mouth, where it is held by nurse or patient. The tractor draws the palate well forward and allows the instrument to be easily inserted. Here cocain through the nose and by way of the mouth answers for anesthesia."

While acknowledging priority to the Schadle-Richards method of retracting the palate, the author wishes to draw

attention to the fact that the object of his retraction is different from that as pointed out in Dr. Richards' paper.

(1) Dr. Richards uses the tape method of retraction in connection with local anesthesia; the author uses it in connection with general anesthesia.

(2) Dr. Richards' object is to provide ample space for the insertion of the adenectome; the author's object is to operate in the nasopharynx under direct inspection, especially in the region of the eustachian orifices.

(3) Furthermore the author makes use of this method as an aid in the management and control of primary tonsillar hemorrhage by means of drawing the posterior pillars over the tonsillar fossæ.

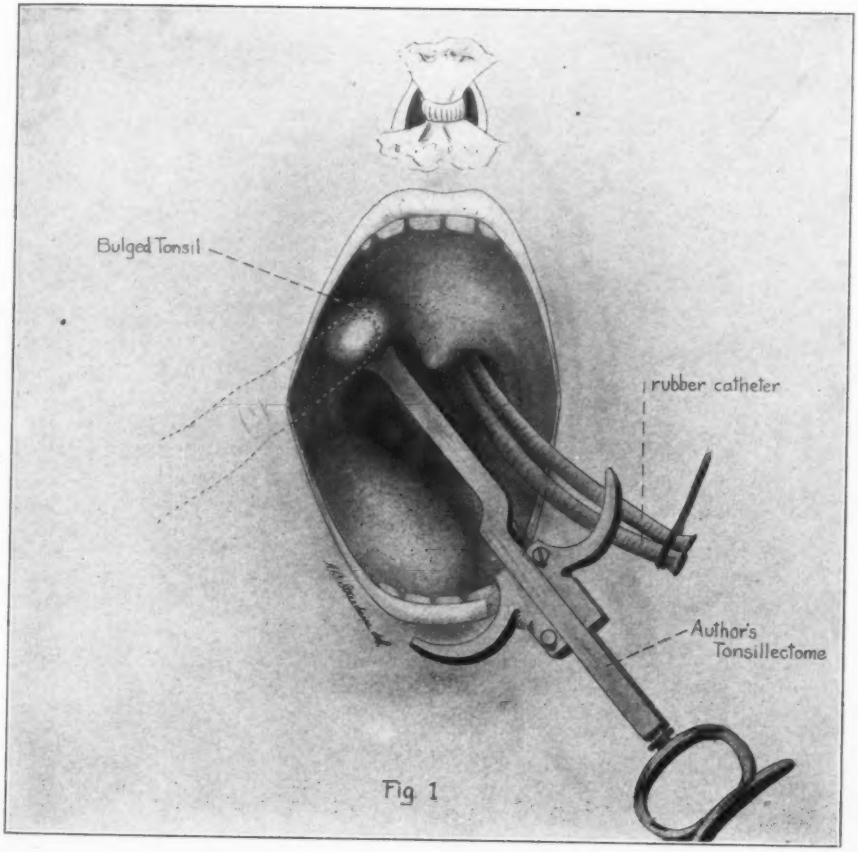

Fig 1

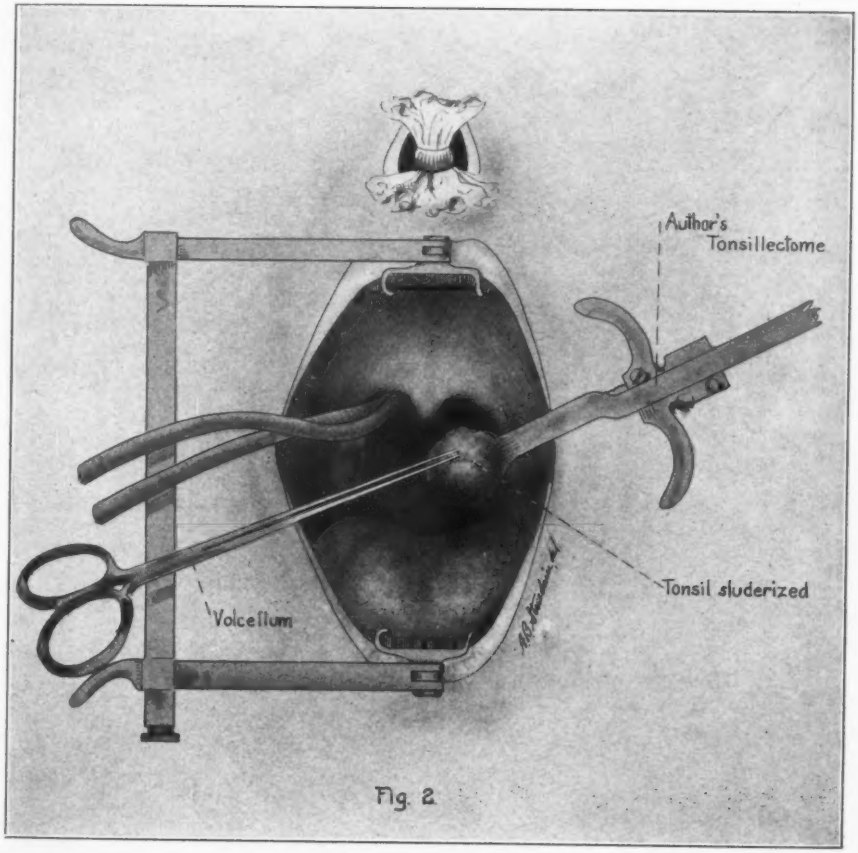

Fig. 2

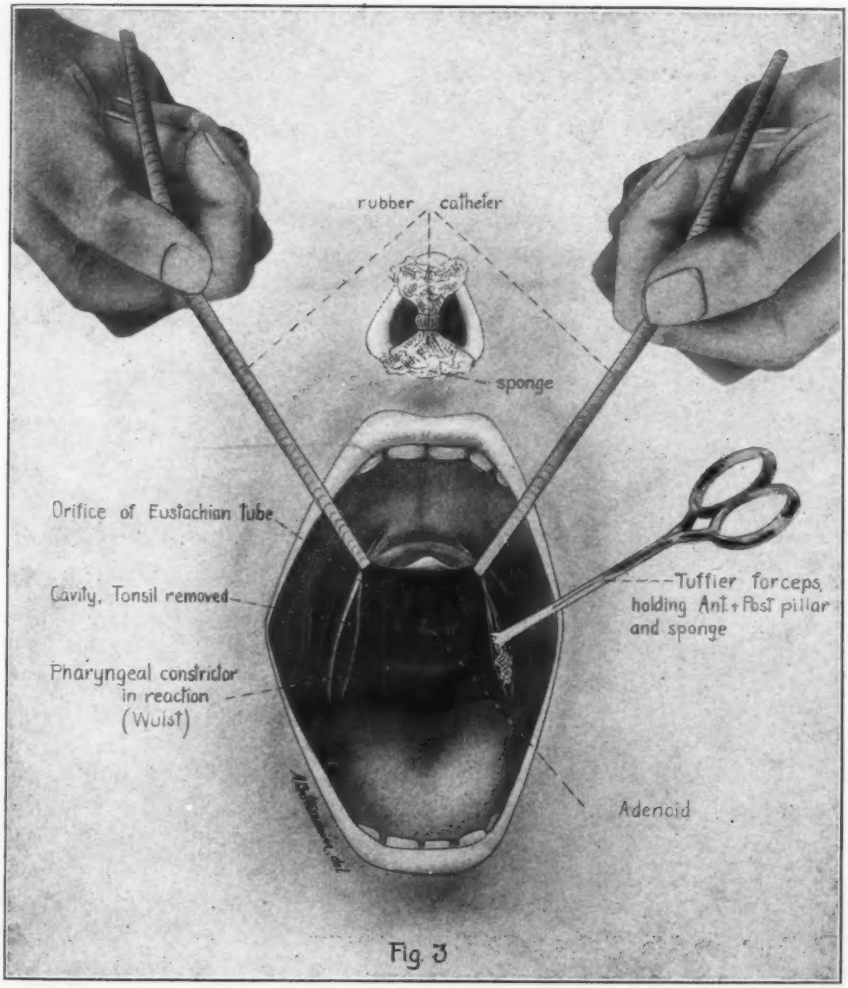
rubber catheter
sponge
Orifice of Eustachian tube
Cavity, Tonsil removed
Pharyngeal constrictor in reaction (Wulst)
Tuffier forceps holding Ant. + Post pillar and sponge
Adenoid

Fig. 3

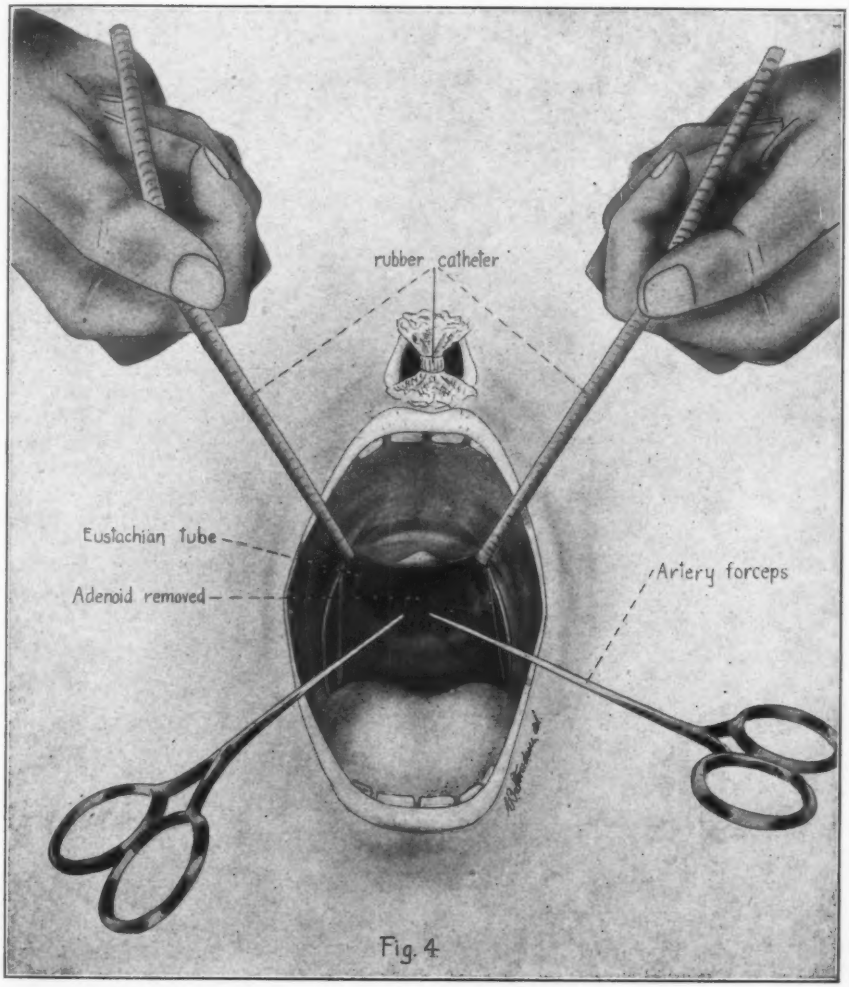
rubber catheter
Eustachian tube
Adenoid removed
Artery forceps

Fig. 4

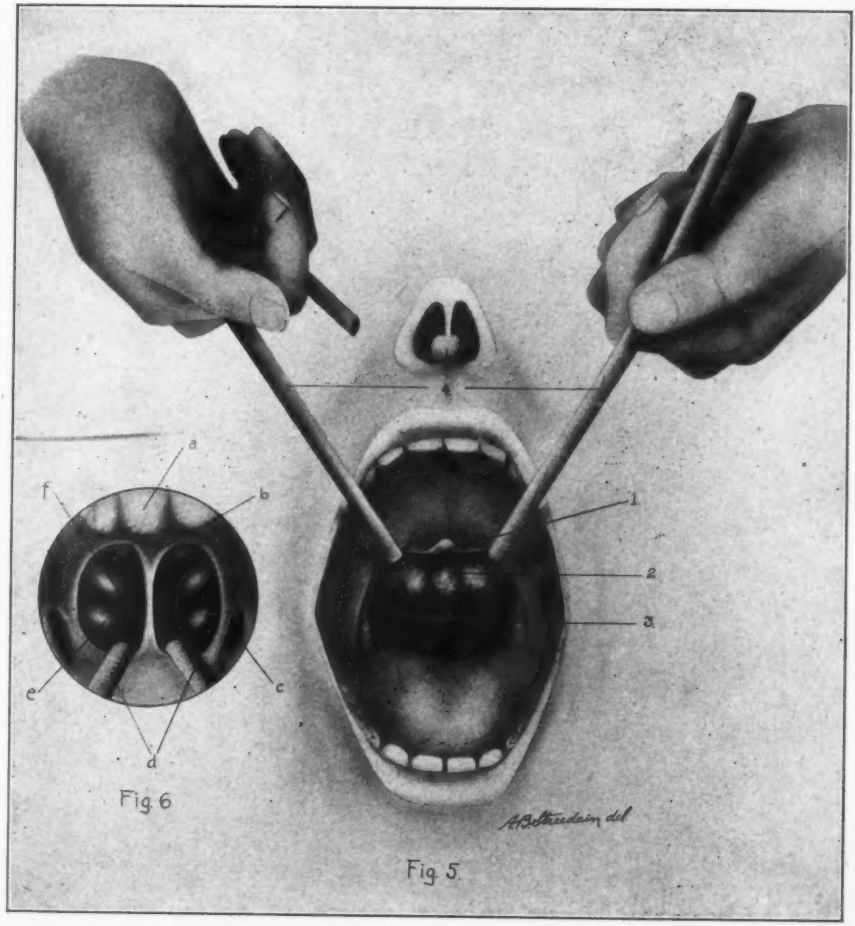

Fig. 6

Fig. 5.

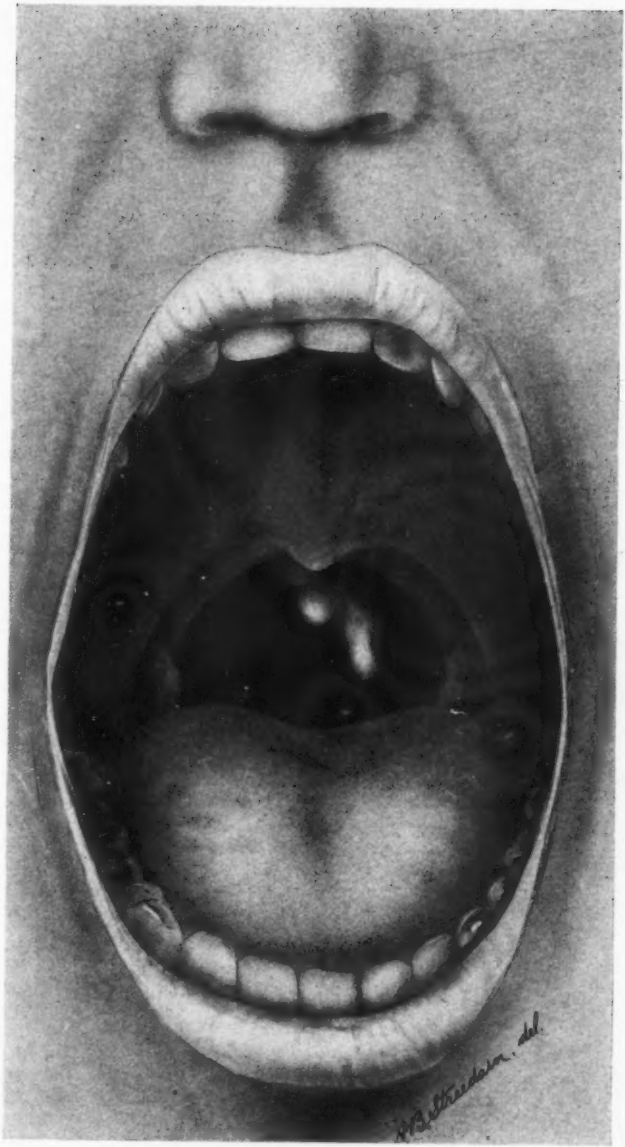

Fig. 7.

Fig. 8.

Fig. 9.

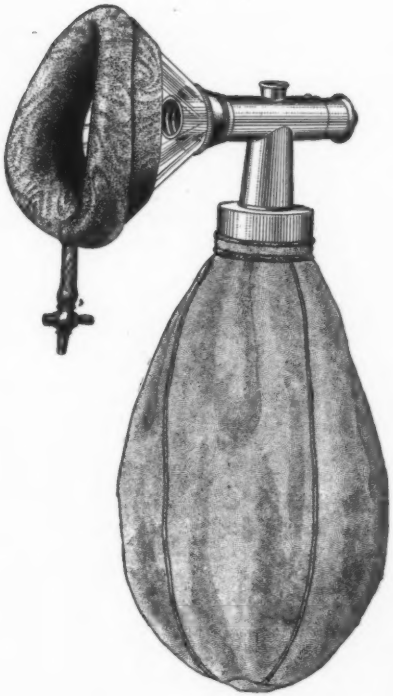

Fig. 10.

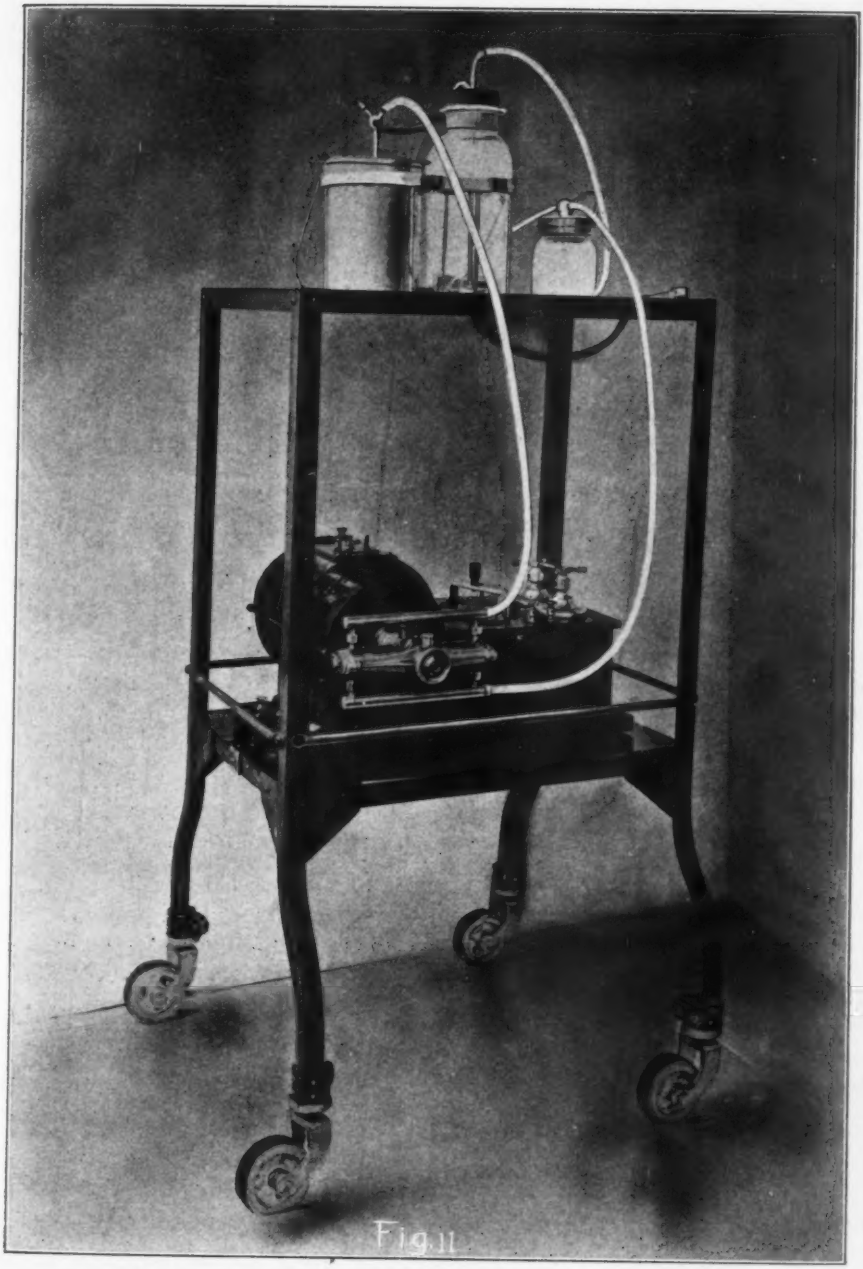

Fig. 11

XIII.

WHEN TO OPERATE ON THE LABYRINTH IN LABYRINTH INFECTION SECONDARY TO PURULENT OTITIS MEDIA.*

By G. E. Shambaugh, M. D.,

Chicago.

The most difficult question in the treatment of labyrinthitis secondary to purulent otitis media hinges on the indications for an operation on the labyrinth. A labyrinth operation in cases of labyrinth infection is called for chiefly because of the danger of a secondary intracranial complication. Invasion of the labyrinth in suppurative otitis media presents a varying clinical picture. The process may be restricted to but a part of the internal ear or it may spread throughout the entire labyrinth. The degree of inflammatory reaction in the labyrinth varies from a slight congestion, with slight alteration in the labyrinth fluids and a partial suppression of labyrinth function, to a diffuse purulent condition producing a total destruction of function. The milder cases of acute labyrinthitis, those which stop short of a complete suppression of labyrinth function, are usually cases of serous labyrinthitis, while the severe cases, those which produce a complete suppression of function, are, as a rule, cases of empyema of the labyrinth. In the milder cases, those which produce but a partial suppression of labyrinth function, we expect, as a rule, a more or less complete restoration of function after the subsidence of the labyrinthitis. In the cases of diffuse empyema of the labyrinth there appears to be always a permanent total loss of function, because the delicate sense epithelium has been entirely destroyed. Cases of acute labyrinthitis do occur, however, where there appears to be a complete suppression of function, both of the cochlea and the semicircular canals, and where on the subsidence of the acute process there is at least a partial restoration of function.

*Read before the Ninth International Otological Congress, at Boston, August 12-17, 1912.

An operation on the labyrinth is not indicated in the milder cases of labyrinthitis, although Ruttin has shown that such cases may occasionally be followed by a fatal intracranial complication. It is only in cases of diffuse empyema, where the function of the labyrinth has already been destroyed, that the dangers of an intracranial complication constitute an indication for a labyrinth operation.

The conditions under which an empyema of the labyrinth presents itself varies. If the process is observed soon after an acute onset, it will be "manifest" by distinct active symptoms—disturbance of equilibrium and nystagmus. If it is seen first after it has existed for some time, all active symptoms may have disappeared and the process may be distinctly "latent." The labyrinth suppuration may be a sequel to an acute or a chronic purulent otitis media. If the labyrinth suppuration develops in connection with an acute otitis media, it may occur as a part of a violent panotitis, such as occasionally follows scarlet fever or measles; or it may occur secondary to the more subacute stage of otitis media, as the sequel of a neglected mastoiditis. On the other hand, an empyema of the labyrinth may be secondary to an acute otitis media, when neither the general symptoms nor the local conditions about the ear suggest a process which would require a mastoid operation.

When an empyema of the labyrinth develops in chronic suppuration of the middle ear, it may occur in cases where the disease process has invaded the temporal bone, with or without cholesteatoma formation, that is, in cases where a radical mastoid operation is already indicated; or it may develop in cases where there exists no clinical evidence of a process which calls for a mastoid operation. A diffuse suppuration of the labyrinth, moreover, may exist as a simple empyema, or it may be complicated by erosion of the capsule of the labyrinth, by fistula formation into the labyrinth, by facial paralysis, or by sequestration of a part or the whole of the bony capsule of the labyrinth.

The dangers of an intracranial complication from an empyema of the labyrinth developing under these varying conditions is not always the same. For example, the danger from a case of labyrinthitis which occurs as a part of a violent acute panotitis or from a labyrinthitis secondary to a

neglected acute mastoiditis, is very much greater than when the invasion of the labyrinth occurs in a milder otitis media without distinct evidence of a mastoid involvement. In the same way, an empyema of the labyrinth occurring in cases of chronic otitis media where there already exists an invasion of the temporal bone or a cholesteatoma, seldom heals spontaneously and is, therefore, much more likely to lead sooner or later to an intracranial complication than when it develops in a case of chronic otitis media where the clinical indications for a radical mastoid operation are absent. An empyema of the labyrinth, complicated by erosion of the labyrinth capsule and fistula formation, facial paralysis or sequestration, seldom heals spontaneously, and is much more dangerous than a simple uncomplicated empyema.

In view of these clinical facts, it is apparent that the indication for a labyrinth operation is much more urgent in certain cases of empyema of the labyrinth than in others. The situation is quite similar to the question of the indication for the radical mastoid operation in the treatment of chronic purulent otitis media. In both conditions grave danger exists of serious intracranial complications. There was a time when this danger in chronic purulent otitis media seemed, at least to some, to constitute an indication in most of these cases for the radical mastoid operation. Otology has now advanced from this position to the place where we are able to make a more or less sharp distinction between those cases of chronic purulent otitis media where the danger from an intracranial complication is such as to constitute an indication for the radical mastoid operation and the cases where this operation need not be done. In the same way there are those today who would advocate the labyrinth operation for all cases of labyrinth infection severe enough to cause a total suppression of labyrinth function. The question arises whether we are able to make a distinction between those cases of labyrinth empyema where the danger of an intracranial complication is sufficient to constitute an indication for the labyrinth operation and other cases of labyrinth empyema where this operation need not be done. Such a question can be settled only by the accumulated experience from the study of a large number of cases of labyrinth empyema. It is well to remember that accurate observation of cases of labyrinth

infection is still comparatively new, and that we have as yet hardly reached the stage where definite indications can be laid down to cover all cases. In view of the large number of cases of labyrinth empyema which recover spontaneously, it is extremely desirable to make a distinction between those cases where a spontaneous recovery is extremely unlikely, that is, those in which the danger of a complication is grave, and the cases where the labyrinth operation may at least be delayed with relative safety, awaiting the first evidence of a further extension.

As pointed out above, the labyrinth operation is not called for in cases of labyrinthitis secondary to purulent otitis media, when the function of the internal ear has not been completely destroyed. In this connection it should be remembered that a circumscribed suppuration of the labyrinth may occur which destroys the vestibular apparatus without involving the cochlea, and which may lead to a fatal intracranial complication without at any time destroying the hearing. Such cases should be treated conservatively, unless evidence of an intracranial extension appears, when the labyrinth operation must be resorted to, even though the operation will destroy the remnant of hearing in that ear. The same method of procedure should be applied to all the cases of labyrinthitis which completely destroy the function of the internal ear, whether they occur secondary to an acute otitis media or in connection with an acute exacerbation of a chronic otitis media, provided no clearly recognized indications exist for a mastoid operation. Furthermore, a labyrinthitis which develops after a mastoid operation, even when it results in complete suppression of function, should be treated conseratively unless symptoms develop indicating an intracranial extension.

On the other hand, the cases of labyrinthitis where a labyrinth operation seems to be clearly called for, include:

First, cases of labyrinth suppuration where clinical symptoms exist suggesting a beginning intracranial complication, such as altered cerebrospinal fluid, severe unilateral headache, etc.

Second, cases where the labyrinth empyema develops as a part of a violent acute panotitis, where the indications for a mastoid operation exist.

Third, cases where the labyrinth suppuration develops as

a sequel to chronic purulent otitis media, where well recognized indications for a radical mastoid operation exist.

Fourth, cases where the labyrinth suppuration is complicated by erosion of the labyrinth capsule, by fistula formation into the labyrinth, by facial paralysis or by sequestration of a part or the whole of the labyrinth capsule.

XIV.

SOME ATTEMPTS AT THE INTRANASAL TRANSPLANTATION OF NASAL TISSUES.*

(Preliminary Report.)

By Samuel Iglauer, B. S., M. D.,

Cincinnati.

The free transplantation of tissues has been extensively employed in general surgery, as exemplified especially in the grafting of skin and in the transfer of bone and cartilage.

In the rhinologic literature, on the other hand, there are very few references to this procedure. Marx[1] reports a case in which he successfully transplanted some fat tissue into a defect remaining after a frontal sinus operation. Portions of the septal cartilage, after having been removed in a submucous operation, have been successfully replaced by Goldsmith[2] and by Kerr.[3] Von Eicken[4] has obtained excellent results through Thiersch skin-grafts introduced into the nasal cavities for the correction of synechiæ. The implantation by Flatau[5] of ivory pegs into the nasal cavities, in order to stimulate bone formation in atrophic rhinitis, can scarcely be classified as a true transplantation operation.

Some time ago it occurred to me that there were certain intranasal conditions which might be benefited or relieved by the free transplantation of the nasal mucous membrane, with or without the underlying bone. Thus, in atrophic rhinitis it seemed promising if one could narrow the wide nasal passages by the introduction of normal bone and mucous membrane. The introduction of mucous membrane grafts to prevent the formation of synechia naturally suggested itself. The free transplantation of mucous membrane for the closure of small

*Read before the Middle Section of the American Laryngological, Rhinological and Otological Association, St. Louis, February 22, 1913.

septal perforations also seemed worthy of trial. Furthermore, all of us have seen the results of some turbinectomy operations in which we devoutly wished that some of the tissue which had been removed might be restored.

Accordingly, in a limited number of animal and clinical experiments, I have undertaken the free transplantation of nasal tissues. Before describing these operations, it may be well to consider some of the general principles underlying transplantation.

Tissues may be transplanted from one part of the body to another part in the same individual, constituting autoplasty; or, the transfer may take place from one animal to another of the same species, constituting homoplasty. Experimental and clinical experience have shown that in all instances autoplasty will give much better, and more certain results than homoplasty. "The more highly differentiated the cells, the less the prospects of successful transplantation. Homoplasty succeeds best with the connective tissue group, such as fascia, tendons, periosteum, bone and cartilage," (Axhausen).[6] Lexer[7] states that epidermis as well as mucous membrane cannot be permanently grafted from one individual to another, while Schoene[8] affirms that skin transplantation may at times succeed between animals closely related, and but rarely between those not related.

Despite the recorded difficulties and failures in the homoplastic transplantation of mucous membranes, I determined to try the procedure. It seemed possible to me that the nasal mucosa might behave differently from other mucous membranes, since its deeper layers are really periosteum which lends itself readily to transplantation. Furthermore, the excellent results recorded with bone transplantation in general made it likely that the submucous implantation of nasal bones would prove efficacious. Two methods of transplantation were employed. The first consisted in surface transplantation upon denuded areas, comparable to Thiersch grafts.

The second procedure was by submucous implantation; i. e., placing the transplant into a pocket formed by elevating the mucosa. In two rabbits autoplastic surface transplantation of mucous membrane containing a sliver of bone was undertaken. In one of the animals the transplanted tissue was found in situ, loosely attached and imbedded, and had apparently survived after two weeks. In the second rabbit, in which the

transplant had been made upon the lateral wall of the nose, the graft was found necrotic at the end of twenty-seven days.

In a dog the following experiment was performed: An opening was made into the nasal fossa on one side, and some of the mucous membrane and underlying bone were taken from the turbinate body on the same side. This tissue, about the size of a five cent piece, was immediately transferred to a tunnel formed by elevating the septal mucosa in the same animal. At the end of seventeen days the animal was killed, and macroscopically the transplant was found alive and in good condition.

The microscopic report by Dr. Brown is as follows:

Slide I: The section shows the transplant firmly in place inside the raised mucous membrane. It is very vascular, seems to be in a healthful condition. Signs of survival are present, inasmuch as some of the cell neucleii stain rather well. Spicules of bone and cartilage are present. Mucous glands are in evidence in the transplant.

Slide II: (a) Shows about the same condition. (b) Practically similar with slight indication of growing cells. (Figs. I and II.)

In none of the above is there any sign of infection and no evidence of an atrophy of the transplanted tissue, nor of its conversion into scar tissue.

A similar experiment in a rabbit showed the tissue intact after three weeks. The microscopic findings were as follows:

Slide I: (a) The transplant seems to be firmly in place under septal mucous membrane. The transplant is highly vascular and in most places shows a comparatively dense round celled infiltration in the fibrous stroma. The infiltration extends sharply into areas of partially resorbed bone and cartilage. The tissue on the whole appears healthy, and no signs of infection are present. In one or two places there seems to be a union between the transplanted tissue and the mucous membrane under which it had been placed.

CLINICAL CASES.

I have the following clinical cases to report:

Case I.—Submucous transplantation of a turbinate for the relief of atrophic rhinitis. H. S., aged 20, male, consulted me, November 10, 1910. Chief complaint, dry throat and stuffiness in the nose. Patient had always been well, except

for occasional headaches, which he attributed to the nasal condition.

Onset.—About a year before he suffered with very dry throat, worse at night, sense of smell less acute than formerly. Very few crusts in the nose without ozena. Had been treated at two dispensaries for eleven months and had used washes and an atomizer.

Present condition.—Pharyngitis sicca, especially on the posterior wall. The inferior and middle turbinates on the right side are hypertrophied and covered with thick mucus. The right middle turbinate touches the septum. On the left side the inferior turbinate is atrophied so that the pharynx is visible through the inferior meatus. The middle turbinal is hypertrophied, boggy at its lower margin, which overhangs the inferior turbinal and touches the septum. There is a small spur on the septum, which deviates slightly to the right.

Diagnosis.—Simple atrophic rhinitis affecting left inferior turbinate. Pharyngitis sicca.

First operation, November 10, 1910.—An electrocautery was applied to the inferior turbinal on the left side, and to a point immediately opposite on the lower external border of the middle turbinate, with the idea of producing adhesions between the two prior to the transposition of a portion of the middle turbinal into the lower meatus.

Examinations two and four days later failed to show any adhesions. Eight days later the middle turbinal was freed by an incision occupying about one-half of its attachment, causing it to drop down in contact with the lower turbinal. Cautery applied to points of contact and packing introduced to hold the turbinals together. Examination one month later failed to show any adhesions, despite repeated cauterization.

Second Operation, February 25, 1911.—A submucous elevation was made through a small incision on the left side of the septum opposite the inferior turbinate. (Width of the uncocainized nose 8 to 9 mm.) A turbinate which had been removed at the same time from an otherwise normal adult was then shaved down to form a wedge containing a spicule of bone. This wedge was about an inch and a quarter long and a quarter of an inch at its thickest part. It was introduced into the submucous tunnel, with the bone in contact with the septum, and was thus completely covered. A small piece of

mucous membrane was also transplanted onto the raw surface of the middle turbinal on the same side. Examination about two weeks later indicated that the transplant had survived in its new situation. One month later there seemed to be some atrophy of the transplant, as the lumen of the inferior meatus was increasing in width. April 20, 1911, the septal mucosa overlying the transplant was incised along the crest of the transplanted tissue, which was thus exposed and found in good condition and firmly united. Subsequent examinations at various times indicated that the transplant was gradually being absorbed. January 22, 1913, examination showed transposed middle turbinate in situ. There is a slight swell at the site of the implantation, but the transplant seems almost entirely absorbed.

Case II.—Surface transplantation of mucous membrane. N. S., male, aged 16. Chief complaint, formation of crusts in the nose. The condition had started several years before with the discharge of mucus from both nostrils, and later with crust formation. Crusts occasionally slide into the pharynx and are hard to dislodge. Gradual diminution in the sense of small; can sometimes notice odor to crusts; occasional hoarseness.

Examination.—Septum somewhat deviated to the right. Right side almost normal. Left side, atrophy of the inferior turbinal so that the pharynx is plainly visible through the nose.

Operation, September 4, 1911.—A portion of the hypertrophied middle turbinate was removed from an otherwise healthy girl of thirteen. After rinsing the specimen in saline solution, it was transferred to a cross-shaped denudation of the septum of the recipient. The denuded area was opposite the inferior turbinal, and a small strap of mucous membrane was left to hold the transplant in position. A light pack was introduced. September 9, 1911, transplant adherent and healthful. Meatus narrowed so that the transplant is in contact with the atrophied inferior turbinal. September 17, 1911, transplant adherent, growing, somewhat smaller than before. September 19, 1911, transplant growing nicely.

Case III.—Free transplantation of mucous membrane onto the surface of a syphilitic stenosis of the nostril. J. S., aged 33, male. Patient had lues fifteen years ago. Nasal obstruction dates back about three or four years. Received salvarsan

two months ago. Diagnosis, slight saddle nose. Cutaneous web just within margin of the vestibule, closing the nostril except for a very small central opening. Complete atrophy of the inferior turbinate on the right side, a few crusts on the middle turbinate.

Treatment.—Incision of the cicatrix, followed by the wearing of a metal splint. Some time later an attempt was made to graft mucous membrane onto the denuded area, but the graft failed to hold.

Case IV.—Transplantation of mucous membrane for the relief of simple atrophic rhinitis. W. S., aged 18, male. Chief complaints, hacking cough, crusts in the left nostril and dry throat. The trouble dates from childhood. In April, 1910, I injected paraffin under the septal mucosa of both sides of the nose. This was followed by less dryness in the throat and absence of crust formation in the nose. This improvement continued until a month ago, when some of the paraffin came out from the left side, with the return of some of the previous symptoms.

Examination.—Partial atrophy of lower turbinate on left side with the ridge, due to the paraffin, still present on the right side. Left nasal passage was patent, especially opposite the inferior turbinal. The pharynx, which was smooth and somewhat glazed, could be seen through the nose on the left side.

Operation, July 1, 1911.—Under cocain anesthesia a cross-shaped incision one and a half inches long, similar to Case II, with a strap of mucous membrane to hold the flap, was made along the septum opposite the left lower turbinal. A piece of hypertrophied mucous membrane was removed from the middle turbinate of another otherwise normal male patient. The transplant was washed in normal salt solution and then placed on the denuded cartilage under the strap. The cavity was lightly packed with gauze, which was removed thirty-six hours later and showed the flap in place (apparently). July 8, 1911, transplant is growing nicely, some granulations along the line of incision. Transplant is in contact with the lower turbinate. Patient states that throat is not as dry as before operation.

About one year later the transplant was still present, but had shrunken somewhat. January 25, 1913, about a year and

a half after the operation, the site of the transplant is still evident, but it does not stand out as a ridge.

Case V.—Transplantation of bone and mucous membrane into the septum for the relief of atrophic rhinitis. A. R., aged 18, male. Complains of headache, ringing in the ears, and throbbing in the head. The trouble began three or four years ago; has crusts in the nose and has lost the sense of smell.

Examination.—Atrophy of right lower turbinate. Hypertrophy of the right middle turbinal with small polypi anteriorly. Marked atrophy of the left lower turbinal, leaving the meatus wide as a lead pencil, with pharynx plainly visible through the nose. Creamy pus in both nostrils, especially surrounding the polypi. No ozena.

Diagnosis.—Atrophic rhinitis with ethmoiditis on the right.

Operation November 30, 1912.—Submucous elevation along the septum on the left, forming a tunnel about one and one-half inches long and about one inch wide. (Cocain-adrenalin anesthesia.) A portion of the hypertrophied middle turbinate of Mr. A., after being submerged in salt solution for about ten minutes, was transplanted into the tunnel. This piece of tissue, about a half inch long and a quarter of an inch in its other diameters, consisted of mucous membrane containing a sliver of bone. Bone placed in contact with the denuded septum, flap pressed down, apposition perfect, meatus very much narrowed. December 14, 1912, transplant still in situ, slight retraction of the mucosa at the line of incision, no pus. Patient complains of slight pain in the left eye. January 11, 1913, some granulating area at the line of incision. Probe introduced here gives the slight sensation of bare bone. A longitudinal incision over the entire length of the graft with the formation of a flap of septum mucous membrane was turned down, exposing the mucosa of the transplant, which appeared normal. February 11, 1913, transplant in excellent condition, closes up meatus to a very narrow slit.

Cases VI and VII.—Two attempts to close a septal perforation with transplanted mucous membrane. On April 22, 1912, I performed a submucous septal operation on Mr. C. S., aged —. During the operation the septum was torn at the site of the original incision. Thereupon I removed a small piece of mucous membrane from one of his turbinals and placed it

into the perforation. This transplant failed to hold and came out in a few days. February 13, 1913, I again attempted to close the perforation, which was about a quarter of an inch in diameter. Cocain and adrenalin were applied, and a buttonhole incision made in front of the perforation. The mucous membrane surrounding this perforation was slightly elevated through this incision. A piece of mucous membrane somewhat larger than the perforation was taken from the hypertrophied middle turbinate of E. B., a healthy boy of thirteen years. It was preserved in salt solution for about thirty minutes before being transplanted, and was then placed under the elevated mucosa surrounding the perforation. Three days later the transplant was still in position and appeared somewhat dark in color. Eight days later the transplant was still in position except at a point occupying about a fourth of the circumference of the perforation. The transplant seemed viable and when rubbed became hyperemic. (Since the above was written the transplant has shriveled and come away.)

CONCLUSIONS.

If we analyze the results obtained in this rather limited series of experiments, we find that there are no especially technical difficulties in the transfer of intranasal tissue from one individual to another of the same species. Surface transplantation in animals will probably fail, owing to the difficulty in preventing infection. The submucous transplantation in animals should yield much better results, and the tissues seem capable of growing in their new environment. The experiments were not carried on long enough to determine what ultimately becomes of the transplanted bone, but it is practically established at the present time that transplanted bone is resorbed, that its framework serves as the scaffolding for new bone which is regenerated in its place.

In the clinical experiments, surface transplantation does not seem to offer very great prospects of success, although the grafts will adhere if the mucosa be slightly elevated to receive them. Submucous transplantation of nasal mucous membrane and underlying bone can be carried out with good prospects of the survival of the transplant without suppuration. It seems, however, that in the course of time the transplant tends to be absorbed. It may be possible to prevent this resorption

by the removal of the roof of the tunnel in which the transplant has been placed. This procedure may stimulate the transplant to functionate and thus prevent absorption.

At any rate, facilities for attempting the transplantation of mucous membrane and nasal bone are abundant in every rhinologic clinic, and with due precautions as to the source of the tissues, these experiments may be advantageously continued.

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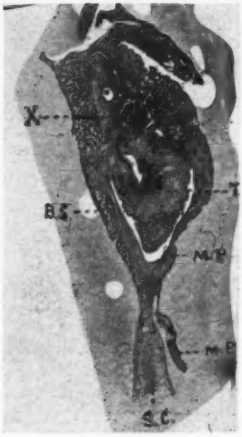

FIGURE I.

Section (magnification 4-1) through a transplant placed under the perichondrium and periosteum of the nasal septum of a dog. S. C., septal cartilage. B. S., bony septum. M. P., mucoperichondrium. M'. P'., same, elevated to form a pouch containing T, the transplant. At X the transplant is firmly united to the bony septum.

(Microphotograph by Dr. Chas. Goosmann.)

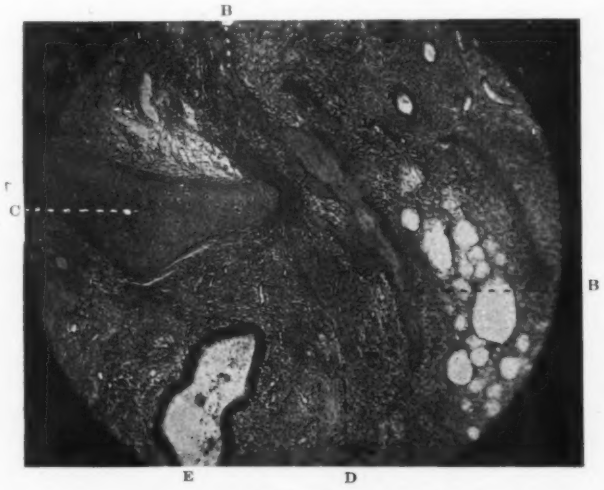

FIGURE II.

Higher magnification (100-1) of another portion of transplant illustrated in Figure I, showing intact condition of bone. B. B. Cartilage, C.; Connective tissue; D, and Glandular epithelium E. (Microphotograph by Dr. Chas. Goosmann.)

XV.

THE REPORT OF A CASE OF PARACOUSTIC VERTIGO AND NYSTAGMUS CURED BY OPERATION ON THE LABYRINTH.*

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A number of operations for the relief of vertigo have been performed on the nonsuppurative labyrinth by Milligan, Lake, Yearsley and others, and Yearsley in his report, "A Case of Severe Vertigo and Tinnitus; Destruction of the Labyrinth; Cure" (published 1908)[1] states that his was the ninth operation of its kind for the relief of distressing vertigo and tinnitus. "The first," he says, "was that of Milligan, the second that of Lake, who, however, antedated Milligan in publication." Since that time Mr. Lake, as he stated in his paper on vertigo before the New York Academy of Medicine last December,[2] has performed fourteen such operations. In this country the labyrinth operation for the relief of vertigo (so far as I have been able to learn) has never been performed before, at least there are apparently no available reports of any.

Last April a report of the history and examinations of this case was made before the Section on Otology at the New York Academy of Medicine.[3] Since that time his disturbing symptoms have been entirely relieved by an operation on his labyrinth. It will suffice to say now that the individual is a strong, healthy man, forty-four years of age, who since boyhood has been affected with a deafness and stuffiness in his right ear, which, until a year or more ago, he could considerably relieve by a movement of his lower jaw. He never remembers having had a discharge from either ear. Seven years ago he noticed that any exertion that caused increased

*Read before the annual meeting of the American Laryngological, Rhinological and Otological Society, May 10th, 1913, Washington, D. C.

heart action, such as lifting, running or even laughing heartily, made him stagger and lose his balance, and at the same time the objects seen by him seemed to move up and down with the pulsations of his heart.

After November, 1910, certain sounds caused such disturbance of his equilibrium and, as he expressed it, of the objects before his eyes, that he would fall when he heard them, if he did not cling to something for support. He had to have the pitch of the whistles on his factory lowered, so that they would not affect him. Riveting machines and other loud sounds affected him in the same way.

Examination (October 6, 1911) revealed a markedly retracted drum membrane and a stenosed tube on the right side, with hearing for acoumeter and whisper, 2 inches and 18 inches, respectively. The left ear showed evidence of chronic middle ear catarrh, with hearing for acoumeter and whisper, 6 inches and 15 feet, respectively. The sound from a 256 fork placed on the vertex was definitely referred to the right or poorer ear. The low tone limit was practically normal in both ears (16 fork was indistinctly heard in the right, distinctly heard in the left ear). The upper tone limit in the right ear was reduced to 6.00 on the Edelmann-Galton whistle, and for the left ear, 2.00. Rinné was positive in both ears. Rotation tests with head in various positions revealed nothing unusual, and the caloric test was normal.

When the right ear was closed, sounds had no effect on his eyes or equilibrium. In the right ear, however, pipe sounds above a^3 (1702 double vibrations) produced marked disturbance until a^4 (3404 double vibrations) was reached. Sounds below and above this octave caused little or no disturbance, the most marked disturbance being caused by the middle notes of the octave. He stated that at the commencement of the sound the object he was looking at seemed to move downward and to the left, and remained in that position with a wavering movement until the sound ceased; it then returned to its original position. The eyes were easily seen to rise and fall when the sound was produced and stopped, and when the most effective sounds were produced his equilibrium was disturbed. At this examination the eyes seemed to move always in the plane of the right anterior vertical canal.

A month after this examination he was admitted to the

Manhattan Eye, Ear and Throat Hospital. A lumbar puncture was performed, and 20 cc. of normal cerebrospinal fluid was withdrawn, and at the same time, because of its marked retraction, an incision was made in the right membrana tympani. Intense headache, dizziness and nausea followed and persisted for the next forty-eight hours, and for two weeks the slightest exertion in the upright position caused severe headache and dizziness. A grateful feeling of clearness was temporarily afforded by the myringotomy, however. After three weeks the patient left the hospital, his vertigo much improved, and sounds that before would have made him fall had no effect upon him.

Three months after the lumbar puncture (the 9th of February) he reported that the staggering tendency had entirely gone, and he had no dizziness, but the right ear had become very sensitive to the sound of his own voice, and speaking above a low tone caused his eyes to jump. He could not whistle, call, or laugh without a jumping of the objects in front of him and a disturbance of his equilibrium. High tones no longer troubled him to the extent they formerly did, but lower pitched ones became so unbearable he had to raise the pitch of the whistles on his plant back to what they were before.

When he said E, P, T, Z, etc., or such a sentence as "Ease it off," objects in front of him moved downward and to the left, and his eyes could be seen to move upward and to the right in the plane of the right anterior vertical canal. If he whistled certain notes, a marked effect was produced, and if the sounds were prolonged, his equilibrium was upset. It was also found at this examination that when the note d^3 (1152 vibrations) was sounded on a pipe, the eyes moved straight upward, and he said the objects in front of him moved straight downward, giving him a sensation of marked disturbance. Above this pitch the disturbance was not so marked, but the objects seemed to move downward and to the right; and below this pitch they seemed to move downward and to the left.

Four months later (July 8th) the patient returned again for examination and reported that since his visit in February he had had a return of his vertigo—that is, staggering while

walking; two attacks, so severe that he had to cling to a fence to keep from falling.

His chief complaint, however, was the effect of his own voice on his eyes. In speaking of this he pointed somewhat confusedly to his supraorbital region and the right side of his head. (It is well to say here that the man is an exceptionally strong character, and through force of will kept constantly at his work. A man less forceful and free from hysterical tendency would have succumbed long before.)

He had to acquire a very low tone of voice in conversation, otherwise the objects in front of him would vibrate up and down obliquely before him. Words like Ease, Peas, Disease, etc., would displace everything in front of him; and if he laughed heartily or said toot-toot-toot, things shifted so suddenly they caused him to lose his balance entirely. At each toot his eyes could be plainly seen to jump.

No less annoying was a pulsating sound like a drum in his right ear, and although he could not remember the time when he was not able to count his pulse by hearing it in his right ear, the present sound was a new development, and it became more marked after mental or physical labor. His only relief when it became unbearable was to lie down for fifteen or thirty minutes; the eye symptoms then subsided entirely and the pulsation ceased except for a slight sound. In using the large and small pipes of the Bezold series, it was found that d^5 (1152 vibrations) on the small pipe caused objects to move straight downward, as was the case at the examinations in February, with marked disturbance (wide movement). The patient could not stand the sound for any length of time, and if it was tooted his equilibrium was upset. a^4 (3404 vibrations) caused objects to move more laterally at about an angle of 45° to the right and downward—the eyes in the opposite direction. Above this point no disturbance was obtained. The lowest note on the large pipe e^2 (640 vibrations) gave marked disturbance downward and to the left. His response to some of the intermediate notes was at times contradictory, owing, he said, to the confusion from the sounds, which caused him to fail to notice whether the movement was first up and then down or vice versa.

I insert here my record of the effects produced by the different pipe notes, not that I am able to interpret anything

of value from it, but simply that it may be recorded in case it may excite the interest of someone with a theory to support:

d^3 (1152 vibrations) on small pipe: Objects move straight downward, as before (in February), with marked disturbance.

e^3 (1280 vibrations): Even more disturbance, but downward and slightly to the right.

f^3 (1363.2 vibrations): Same, with less disturbance.

g^3 (1536 vibrations): Practically no disturbance and slight movement.

a^4 (3404.8 vibrations): Objects move more laterally at about 45° to the right, eyes move in the opposite direction; above this point of a^4 no disturbance of eyes is obtained.

g^4 (3072 vibrations): Objects move upward and slightly to the right.

f^4 (2726.4 vibrations): Objects move upward and beginning to curve towards the left with marked disturbance.

c^4 (2048 vibrations): Obects move upward and a little to the left.

a^3 (1702.4 vibrations): Objects move upward and a little to the left.

g^3 (1536 vibrations): About the same.

e^3 (1280 vibrations): Almost gone.

d^3 (1152 vibrations): Getting worse again.

c^3 (1024 vibrations): Bad; upward and to the left.

f^3 (1363.2 vibrations): Upward and to the left.

a^2 (851.2 vibrations): Straight down.

g^2 (768 vibrations): Marked disturbance, up and down to the left.

f^2 (681.6 vibrations): Marked disturbance, down to left.

e^2 (640 vibrations) lowest pitch in pipe: Gives marked disturbance downward and to the left.

This examination was confusing and fatiguing for the patient, and he himself remarked that he could not observe accurately because of his dizziness and disturbance. This probably accounts for the contradictory answers.

As the patient's disturbing symptoms seemed to grow worse rather than better, operation for the destruction of his labyrinth was at last resorted to. A pneumatic mastoid with normal looking cells was opened, and there was no evidence

in either the mastoid or the middle ear of necrosis of any kind.

In attacking the labyrinth the horizontal and anterior vertical canals were opened and traced forward until their ampullæ were reached. These were removed, and the canals were then followed backward and the vestibule was entered posteriorly through the solid angle. The stapes was removed, and, because of the acoustic disturbance, it was thought best while at it to open the cochlear also, so the promontory was then cut away.

An instrument devised by Dr. Kerrison, which easily shaves the hardest bone, enables one to avoid the use of chisels and the accidents which sometimes follow their use in this operation. Particularly those accidents referred to by Dr. Richards:[4] namely, the tendency of the external canal to crack through definite lines of cleavage into the fallopian canal and cause injury to the nerve, and the modiolus to crack at its base and open the internal auditory meatus with an escape of cerebrospinal fluid.

Judging from appearance only, it might have been a normal labyrinth that was being operated on. The eustachian tube was curetted thoroughly down through its isthmus with Yankauer's instrument designed for that purpose, but there was no antiseptic treatment of the wound, as I had not then heard Mr. Lake advise it as a wise precaution. The wound was washed with normal salt solution and packed with plain gauze, a little iodoform gauze being placed next the labyrinth itself. Ten days later a meatus and flap were cut and the incision was closed behind. Three weeks later the cavity was skin grafted. There was no exposure of the facial nerve and no paralysis.

For several days after the operation the patient lay on his sound side, hunched up with his eyes closed. Nausea and vomiting persisted for four days.

At an examination on September 9, 1912 (five and a half weeks after the operation), he stated that after the fourth day following the operation the disturbance of objects was not as great with his left eye open as it was with both eyes open, and he appeared to have less control over the right eye than over the left; the disturbance was more marked when objects were seen with the right than with the left eye. He had diplopia with both eyes open, which persisted for a week. Even at

that time (September 9th), six weeks after the operation, he had diplopia when he first opened his eyes in the morning; a disturbance he had never had before the operation. He stated that after the labyrinth operation, despite the intense nausea and vomiting, he noticed that objects moved from "high left to low right;" that is, they moved from left to right downward at an angle of twenty degrees. This persisted for a week and gradually diminished until there was no movement of objects except when he first awoke in the morning. Six weeks after the operation, on waking in the morning, objects still seemed to move slowly in this direction, but after a few minutes he would be able to overcome the illusion.

Never after the operation was he disturbed by any sounds in his ears. In this he differs from Dr. Richards' case, to be mentioned later, of the man who suffered marked disturbance from sound after his labyrinth had been removed. An attack of vomiting, or any exertion, during the first week or two after the operation, would cause a gradually increasing sound, "like the passing of a subway train," in his operated ear; it occurred first faintly, and then became louder and louder like a very heavy storm, lasting a short time and then gradually subsiding. These noises became less and less frequent, but they were occasionally noticed for three weeks after the operation. Never since the operation has sound had any effect on his equilibrium, or on the movement of objects, or on his eyes themselves; nor has increased heart action caused any disturbance whatsoever. He can whistle and toot-toot-toot with great satisfaction and without any disturbance to him of objects or of his equilibrium.

On the ninth day after the operation the patient was allowed to sit up in bed, because he desired to do so, and thought he could. The movement, however, caused a return of the dizziness, and after a few minutes he was glad to lie down again. On the eleventh day he was allowed to stand on his feet, but he would have fallen to the floor towards the operated side had he not been supported. He persisted in getting up, however, and three days later was able to walk the length of the hall unassisted, though he was very unsteady, and had a tendency to fall towards his operated side. Turning to the left at first caused a little disturbance, but this soon disappeared. On turning to the right, however (to the operated side),

marked disturbance was produced, and even a movement of his eyes to the right at the examination, six weeks after the operation (September 9th), was accompanied by a movement of all the objects to the right. This movement of objects became less every day. The patient was then able to walk without falling, with his eyes closed. He had practiced whirling, turning and walking backwards until he had excellent control of himself, although all signs of disturbance had not entirely disappeared. There was still some nystagmus on looking to the left, practically none on looking to the right. On rotation to the left ten times, after-nystagmus was slight and lasted only twelve seconds. On rotation to the right, after-nystagmus lasted only fifteen seconds, but he complained of considerable disturbance and felt a little sea-sick, although the seasickness was only momentary.

An examination made November 11, 1912 (over four months after the operation), showed the cavity well dermatized except for small granulations which persisted at the opening into the vestibule, posteriorly. From this region there seemed to be a slight leakage of clear fluid, and when it was irritated with an applicator, some disturbance of equilibrium and objects was remarked by him.

The patient was greatly improved, and neither exertion nor sound gave him any further trouble. He had no disturbance of equilibrium except when he turned quickly to the right. He was still, however, unable to walk with certainty with his eyes closed, or in the dark.

A letter received on the 11th of January, 1913, from Dr. A. P. Butt, his physician, stated that the ear was healed; and one from the patient himself, about the same time, informed us that he feels splendidly all the time. In answer to questions, he says he is not yet able to turn to the right quickly without disturbance, and that turning his head and eyes suddenly to the right causes him to sway. He still experiences difficulty in walking at night in the dark, or with his eyes closed, though the difficulty is becoming less. There is no movement of objects after exertion, or pounding in the ear, as there was before the operation. There is no disturbance of equilibrium due to sound, either external or from his own voice. He still has a slight hissing tinnitus, which he had before the operation,

a point worth noting in regard to operation on the labyrinth for persistent tinnitus.

With the exception of Dr. Richards' case, and Mr. Lake's two cases, one of the man whose vertigo was brought on by exposure to a bright light and loud noises,[2] and the other whose attack followed his listening to a band,[5] in none of the many cases of vertigo reported have I been able to find sound mentioned as a casual factor, though Dench says:[6] "It should be borne in mind that when any portion of the auditory apparatus, either of the middle ear, the labyrinth, or the nerve trunk, is in a pathologic condition, any slight stimulus—particularly an increase in the blood pressure—may be sufficient to bring on an attack of vertigo."

The cause is frequently found to be due to derangement of the sound transmitting apparatus or to changes in blood pressure; but, as I said before, with the exceptions mentioned, I have found no case where sound itself was the exciting cause of the vertigo.

In regard to blood pressure, I recall here that Mr. Lake recently in his remarks after the presentation of his paper before the Academy of Medicine in New York, speaking of its influence on vertigo, seemed of the opinion that the virtue claimed by many for lumbar puncture was due solely to its effect on the blood pressure, and that a more lasting benefit could be obtained with depletives and drugs in such cases than with lumbar puncture itself. In this he does not agree with many who have for some time advocated lumbar puncture without very definite reasons for expecting permanent relief from it, and more recently with Bárány,[7] who claims for it marked benefit, and often permanent relief in certain cases where the vertigo and "Symptomen-komplex" are due to adhesions of the pia in the region of the cerebellopontine angle which are broken up by the sudden withdrawal of the cerebrospinal fluid.

Blake[8] calls attention to the condition of the sound transmitting apparatus as playing an important part in the causation of vertigo, but mentions nothing about the effect of sounds on it.

A comparison of this case with the one Dr. Richards[4] mentions in his "Treatment of Purulent Affection of the Labyrinth," etc., etc., forms an interesting paradox. In his case,

disturbance of equilibrium was caused by certain sounds after the removal of the labyrinth, and in this case the opposite was true, in that the disturbance caused by certain sounds was cured by the removal of the labyrinth.

Dr. Richards tells me that he removed not only the labyrinth, but almost the whole of the petrous pyramid for suppurative labyrinthitis in his case (a young musician), and that the young man while convalescing seated himself at the piano to play, but when he struck the keys he was knocked off the stool by the sound, and for months afterwards, even after the cavity had healed, musical sounds from the piano disturbed his equilibrium. He also says that while dressing this case, when he touched the stump of the nerve, or the soft tissue about it in the region of the internal auditory meatus, which he had opened, the patient never failed to remark a noise in that ear, but when the bone near that region was touched with a probe no sound was heard.

Following the mention of this case in his article, he says: "It would appear that we receive through the auditory apparatus certain physical impressions which, when transmitted to higher centers, act as supporting influences to the preservation of station; that these, when not balanced by similar impressions acting upon the other ear cause, so to speak, an auditory imbalance; that the disturbance is due to the lateralization chiefly to one side of those impressions which give rise to the subjective phenomenon of sound is questionable, inasmuch as the patient, who was totally deaf before operation, experienced then no such disturbance under similar conditions." He continues, saying: "The phenomenon is suggestive of the great variety of factors which may act through the medium of the auditory apparatus and contribute to the preservation of that condition which we speak of as the state of equilibrium—it gives us an insight into the intricacy of the function of the auditory apparatus."

The disturbing, jangling effect of musical instruments, pianos particularly, on ears recovering from acute middle ear suppuration or some other disturbance of the conducting apparatus, is a familiar one, and although the effect is not usually so great as to cause loss of balance, it not infrequently causes a sensation closely akin to it.

The association of the acoustic with the static labyrinth in

the subject of this report is interesting, and it along with the views of Richards, as expressed above, might be considered by some to support v. Cyon's theory, an expression of which I quote from Dr. Fridenberg's[9] review of v. Cyon's theory of the labyrinth: "v. Cyon proceeds to develop his own theory, which brings the elements of tone and sound perception into relation with the innervational control and regulation, both as to intensity, succession, and duration, of the entire muscular apparatus of the body, especially of the eye; with the rhythmic coordination of speech and with the psychic control of function. This coordination depends on concepts of number which can only originate in the cochlea, and is associated with concepts of direction, dependent physiologically on stimulation, continuous or intermittent, of the semicircular canals."

Later, in his criticism of v. Cyon's theory, he says: "Biologically (too), auditory sensations can hardly be made use of as a basis for an adequate stimulus of the semicircular canals, as these sensations have not yet appeared in lower animals which are capable of perfect orientation."

In the case just reported, it would seem that when the auditory apparatus was stimulated by sounds of a certain number of vibrations, a definite movement of the eyes took place in the plane of a certain semicircular canal in the diseased ear. So, according to Flouren's law, there was caused by the sound vibrations just as definite a movement of endolymph in the ampulla of that canal as there was by the pump acting directly on the canal in Ewald's experiment. But pulsations from the heart also at times caused the same disturbance, so the commotion in the ampulla cannot reasonably be associated with the effect on the auditory apparatus alone. It would seem, rather, that the effect on the ampulla was coincident with but separately caused by the (sound) vibrations, which transmitted through the cochlea were interpreted as sound.

With this conception one can still maintain the theory of the distinct separation functionally of the auditory from the static labyrinth, and receive the support of the biologists and that of long general acceptance as well. One can still support this theory and realize that the localization of sounds may play a part in orientation, just as localization of objects by means of the eyes do, and the muscle and tactile senses do, but that does not mean that one has to accept the view that

such a close association exists between the two, static and auditory, that sound through irritation of the cochlea influences the endolymph in the ampulla, for it is only when the contents of the ampulla are abnormally sensitive or irritable that the same quality of vibration affects them both.

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XVI.

ATROPHIC RHINITIS WITH OZENA—ITS ETIOLOGY AND SURGICAL TREATMENT.*

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INTRODUCTION.

From the discussion of atrophic rhinitis with ozena, as found in the literature, it is evident that special investigators are particularly interested in two methods of procedure in the study of the cause and treatment of this disease. First, in an attempt to isolate a specific organism and establish a method of treatment based on such findings, and second, in looking upon the symptom complex as due to pus producing organisms, causing multiple foci that are amenable to the recognized surgical principles of drainage and cleanliness.

The difficulties encountered by an investigation along the first procedure are due to the results of decomposition and secondary infection, which give rise to an innumerable bacterial flora and interferes with an attempt to determine which particular one is the active organism in the disease.

Renewed interest has been awakened of late by the work of Abel and his experiments with the bacillus mucosus ozenæ. This painstaking work has led others to attempt to substantiate his claims. An excellent article, among others, appeared last year in this country, by Cobb and Nagle. This phase of the subject has already in previous years engaged the attention of members of the profession, notably, Lowenberg, Pesand, Gradenigo, Dreyfuss, Loeb, Ambi, Brindell, Gruenwald, Hajek, Marano, Abel, and others, but without any definite results.

In the second method of procedure, where the symptom complex is considered as due to an attenuated infection with

*Read before the Nineteenth Annual Meeting of the American Laryngological, Rhinological and Otological Society, held at Washington, D. C., May 8, 9 and 10, 1913.

multiple foci, secondary to a pansinusitis, this would suggest that the original infection is not followed by an essential or primary atrophic process acting as an intermediate step, but that the sinuses are invaded directly by a pus producing organism. While it is conceivable that fetor and crusting might be produced by the breaking down of soft tissue, bone necrosis and defective drainage, with the resulting secondary infection, yet we know that certain pus producing organisms by themselves are capable of causing a thin, others a thick, secretion, and still others may cause fetor and crusting. In this sense a specific organism might be necessary to produce ozena, but not necessarily have, as its primary manifestation, an atrophic tissue change. If we accept the latter view, which the writer believes is true, we can with advantage continue to search for a specific organism and at the same time perfect our surgical technic, because purulent retention within nonelastic walls requires free drainage, as a prerequisite to cure, whatever the infective agent might be.

THEORIES.

From the earliest medical records to the present time, many theories have been advanced as to the etiology of ozena, but none of them have had a considerable following among men of eminence. For a review of this literature you are referred to the excellent article by Sendziak in the ANNALS OF OTOLOGY, RHINOLOGY AND LARYNGOLOGY for 1907.

That tuberculosis and syphilis cause a certain number of cases is conceded, but the researches of Sobernheim, Eisenlohr and Alexander by the aid of the Wassermann test showed that syphilis, the disease most suspected as a cause of ozena, was responsible for relatively only a small percentage.

Bosworth's theory of a preceding purulent rhinitis, with no sinus involvement, as a cause of ozena in later life, has been questioned by the researches of Pearce at the Boston City Hospital, and of Pearce and Winne at the Albany Bender Laboratory, who showed conclusively that the sinuses are often invaded by a pus producing organism in the course of the infectious diseases as early as the second year. Is it not also the experience of all rhinologists, with their present better knowledge of sinus infections, that a primary purulent rhinitis is a thing of the past? It is always secondary to some focus of infection in the epipharynx or hollow spaces.

Theories based on the shape of the face as being a cause are less often referred to today, with our more definite pathology on which to base a diagnosis.

The Herd theory of a sinus disease as a cause of ozena, has had such able exponents as Gruenwald, Hajek, Loehnberg, Michel, and not a few among the members of this society. Although this theory has not been generally accepted, yet the writer brings this phase of a much discussed subject before you today again, because of his belief that the rapid advance in our knowledge of and ability to cure sinus disease, has opened new possibilities in the study of the etiology and cure of ozena, even granting a specific organism.

In the past, when treating these focal troubles intranasally, even if we agreed as to its etiology, yet our knowledge of the surgical technic of sinus disease has advanced sufficiently to make it possible to adopt a common method of common exenteration of involved cells. This would in turn lead us to some definite agreement for or against a focal infection, as being the chief underlying cause of this disgusting affection.

PERSONAL WORK.

It is for this purpose that I venture to offer the results of the following surgical procedure, after briefly stating the grounds which, in my opinion, implicate the accessory sinuses, without there being a true atrophic rhinitis.

First, the writer has never seen a case of a socalled atrophic rhinitis that was not relieved by thorough drainage, instead of being made worse, as would be the case if trauma and increased air space were added to a genuine atrophic mucosa.

Second, the crust formation and fetor, when unilateral, are always on the wide side, where they have apparently been preceded by a compensatory hypertrophy of the second turbinate, due to the deviated septum. This enlarged turbinate would in turn interfere with the proper drainage of a subsequent sinus infection.

Third, the discharge of pus over a mucous surface in a long standing case is, in the writer's experience, always accompanied by a glazed appearance of the mucosa, dryness and an exudate, a low grade catarrhal process, and not a true atrophic process. That this is not a true atrophy is shown by the return of function of the mucous surface with the establishment

of free drainage and the cure of the underlying focal infection. This is often seen on the posterior wall of the pharynx in cases of chronic sinusitis of the sphenoid cavity or posterior ethmoid cells.

Fourth, radical surgery, with the object of establishing free drainage, lessens the tendency to crust formation, instead of increasing it. The lessening of crust formation is in proportion to the thoroughness with which the affected cells are drained. This is followed by a purulent or mucopurulent discharge, until the diseased surface is made healthy by topical applications and cleanliness. Nowhere in the body does nature tolerate so much abuse as in the nasal chambers, if we provide for free exit of the secretions.

Fifth, ethmoid disease, the writer believes to be the most constant of the infectious processes in the nasal chambers. As a suppurative ethmoiditis it is easily recognized. On the other hand, there are inflammatory processes of the ethmoid cells which are less active, or where the drainage is better, in which case they are characterized by serous infiltrations, dilatation of the capillaries, with the mucous membrane dry and red; and if seen after the process has been going on a certain length of time, there is found covering the mucous surface an exudate which is made up of dead epithelium, pus, mucus and blood. These seem to be the steps and the macroscopic appearances clinically of a certain type of catarrhal ethmoiditis. This type of an inflammatory process, where it fails to undergo resolution, passes into a chronic condition, which the writer has repeatedly noticed, was spoken of by many clinicians as atrophic rhinitis. Since these cases of atrophic rhinitis get well under improved drainage, the question would, therefore, arise, whether the clinical term of "atrophic rhinitis" is a misnomer, or the pathologic understanding of atrophy is incorrect. To the writer it is inconceivable that a true atrophy with destruction of the glandular elements and an increase in the connective tissue stroma should resume its function clinically, as is the case of the mucous membranes of the nasal chambers where a free exit for the secretions is provided. Such cases untreated may continue indefinitely, but when the ostia become obstructed by inflammatory changes, and drainage is interfered with, a sub-

sequent active infection may take place, resulting in a suppurative ethmoiditis.

Sixth, the general systemic symptoms, such as pallor, loss of weight, muscular weakness, gastric and other symptoms, are a sequel rather than a predisposing cause of the local condition. These symptoms are found to improve with diminished absorption as the local condition is relieved.

Seventh, the writer's cases of ozena have shown the morbid process more uniformly to be in the ethmoid and sphenoid sinuses. Next in frequency have been the ethmoid, sphenoid and frontal, and last the ethmoid, sphenoid and antrum.

The preceding observations were further strengthened by the classical work of Gruenwald on nasal suppuration, and the report of cases by Michel, Loehnberg, Hajek, Mayer, Beck, Theissen, and others. Although in the beginning of this work the cases were tedious and necessarily difficult to cure, owing to the haphazard way individual cells were attacked at that time and their proneness to relapse with reinfection, yet the results during the last four years have grown increasingly more satisfactory with added experience and a better technic. I wish to emphasize right here that the successful results in the treatment of these cases of socalled atrophic rhinitis with ozena depends absolutely upon the careful after-treatment, which is fully as important as the thorough surgical exenteration. Regular and painstaking care must be exercised until all the affected surface is brought into a healthy condition; and even then for a long time we have a membrane with low vitality, easily reinfected and functionally disturbed.

GENERAL DESCRIPTION OF CASES.

The clinical cases fall into two general classes: one the typical cases of Fränkel, with crusting, fetor, anosmia, necrosis and sloughing of the soft tissue, and the second the atypical cases in which fetor and crusting may be absent, and where the diagnosis of attenuated sinus infection might be more an open question. Contrary to the established facts in the treatment of disease, the older the stage of this disease the easier it is to cure. This is in perfect harmony with the sinus theory of the etiology of ozena, owing to the fact that in the third stage, where the infection is less active, the ostia open and the drainage more or less perfect, due to the necro-

sis and the sloughing of the soft tissue, there is left a smooth bony surface, and therefore the cure is relatively easy.

In the second stage, although earlier in the disease, with the mucous membrane boggy, drainage blocked, and the entire surface covered with a thick, firm crust, the problem is increasingly difficult.

The element of fetor has not seemed to the writer to indicate that a case would present any additional obstacle to healing, for the reason that the odor may be due to a particular organism, not necessarily more virulent or more intractable to overcome than those with little or no odor. In fact, the only serious problem is an anatomic one. In those cases where the cells are developed in the floor of the frontal sinus or out over the orbit, it is obvious that drainage must be obtained by extranasal methods. If we assume that drainage is essential, then we must admit that a certain percent of cases of ozena, presenting these anatomic peculiarities, cannot be cured by any intranasal procedures, whether these are along medical or surgical lines. These variations in development have been pointed out by Shambaugh in an excellent article entitled: "The Construction of the Ethmoid Labyrinth," in the ANNALS OF OTOLOGY, RHINOLOGY AND LARYNGOLOGY, Volume 16, 1907.

We approach our surgical procedure then with the understanding that—

First, for anatomic reasons, all cases cannot be cured intranasally.

Second, that when functionally cured, the previously infected surface is prone to relapse, due to reinfection.

Third, that only constant attention to drainage, the removal of polypi, topical applications and cleanliness, following radical exenteration, will avail in any case.

Given these conditions, the writer believes that as large a percentage of cases of ozena can be brought to a successful issue as we could expect to cure intranasally, cases of undoubted pansinusitis.

SURGICAL TECHNIC.

The first step consists in anesthetizing the patient in a reclining position. He is then placed in a chair and the nasal mucosa is adrenalized. The sphenoid opening is next located with a probe, and if not easily accessible, part of the second turbinate

is removed, in order that we may take away enough of the anterior sphenoidal wall, so that the enlarged sphenoid opening can easily be recognized when the landmarks have been removed. Next the method of Mosher is employed to systematically exenterate under direct vision the ethmoid labyrinth. With the head tipped back the agger nasi cell is located a little above and in front of the attachment of the second turbinal, corresponding to the rounded eminence on the outer nasal wall. This is found with a curette, by first feeling for the hard surface of the superior maxillary process and then working toward its posterior margin until you break through the thin outer wall of the cell, which corresponds to a large cavity lying at the floor of the nasofrontal duct. It is now important to bring the head forward so that it is at right angles to the body. The curette is then turned so that it faces the nares, away from the orbit. With a lateral to-and-fro motion the inner cell walls and partitions can with a little practice be easily broken down back to the posterior ethmoid cell by the sense of touch. The point here which the writer wishes to emphasize is that the curette is not to be used to remove the lining membrane, but as an instrument to break down the bony partitions and nasal wall of the cells.

This leaves the second turbinate turned down and attached by a narrow base which can be wholly removed by the nasal scissors or forceps in a few minutes. We next pack the operative field with strips of gauze wet in a solution of adrenalin 1/3000. We can now work on the opposite side, where our original operative procedure is duplicated and the field tamponed. The gauze in the first side is then removed, the enlarged sphenoidal opening sought, and its remaining anterior wall is then removed up to the posterior ethmoid cell. The field is then gone over by introducing the little finger into the nares in order that we may detect any irregular bony projections or margins of cells that may interfere with drainage. All granulations and polypi should be removed without destroying the entire mucous lining. The patient is then returned to bed without any nasal packing.

AFTER-TREATMENT.

First, mechanically remove all crusts gently, to avoid bleeding. If the drainage is good, after the first week or ten days

these will cease to form and the discharge will have become mucopurulent.

Second, after the first week remove all polypi that may appear. These will tend to return for several weeks.

Third, use the Bier suction apparatus, after first washing out the sphenoid cavity with a canula. Watch especially the sphenoid opening at its margin, where it tends to granulate in rapidly and obstruct drainage, as pointed out by Hajek. Touch the margin with silver nitrate or trichloracetic acid until it remains permanently open as the result of cicatrization.

Fourth, make the surface dry by gentle pressure, and after the first week apply a 4 to 8 per cent solution of nitrate of silver, especially to the sphenoid cavity itself and over all unhealthy areas wherever found.

Fifth, if the patients live at a distance, allow an alkaline wash to be sniffed twice daily, from the hand or a tablespoon. The surplus water should then be blown from the nares without taking hold of the nose, on account of the danger of back pressure in the eustachian tubes.

Sixth, do not allow a water spray of any kind to be used. For four weeks the patient should be seen two or three times a week; then for four weeks more, once a week, and after that at irregular intervals until discharged. Remember to caution the patient that an acute infection will bring on a relapse which should be attended to at once. This usually means only a few treatments after the acute infection subsides.

GENERAL SUMMARY.

The interest of the profession in the etiology of ozena seems, from the literature, to be centered upon two methods of procedure. First, in an attempt to isolate a specific organism; and second, in looking upon the symptom complex as due to pus producing organisms causing multiple foci.

The difficulty in isolating a specific organism arises from the innumerable bacterial flora resulting from decomposition and secondary infection.

The secondary procedure does not admit an essential or primary atrophy as an intermediate step in the disease.

Theoretically, a specific pus producing organism might cause fetor and crusting without a true atrophic process.

That tuberculosis and syphilis are the underlying cause of ozena, except in a small per cent of cases, is not probable.

Bosworth's theory of a preceding purulent rhinitis in infancy without a sinus infection is questioned. The postmortem reports of Pearce and Winne show sinus involvement as early as the second year in the course of the infectious diseases.

More definite pathology has led to the abandonment of many former etiologic theories. The rapid advance in our knowledge of and ability to cure accessory sinus disease, makes it now possible to adopt a more uniform surgical technic for their exenteration. This should show more definitely the relationship of sinus infection to ozena. What seems to be an atrophic process is always improved by drainage.

A sinusitis frequently develops in the following manner: A septal deviation is followed by a compensatory hypertrophy of the second turbinate, with a resulting catarrhal ethmoiditis. This hypertrophy and catarrhal inflammation so interfere with drainage that a subsequent infection by a pus producing organism makes a sinusitis probable.

A chronic catarrhal inflammation accompanied by an exudate is frequently spoken of as an atrophic process. The return of function with improved drainage shows that it is not a true atrophy. Radical surgery, by establishing better drainage, lessens the tendency to crust formation. Is atrophic rhinitis then a misnomer?

The general systemic symptoms are secondary. The writer's cases have shown the morbid process more often to be in the ethmoid and sphenoid sinuses; next often in the ethmoid, sphenoid and frontal, and last, the ethmoid, sphenoid and antrum.

There are two types of clinical cases, one the typical cases of Fränkel, and the other the atypical cases, with fetor and crusting. The atypical cases are less open to question in regard to sinus involvement. The third stage of the disease is more easy to cure. The after-treatment is as important as the surgical exenteration. Fetor does not indicate a more intractable case. The serious obstacle to cure arises from an abnormality in the development of the bony cells. When such abnormal cells are present, certain cases of ozena are incurable by any intranasal method. All cases are easily reinfected, but respond readily to local applications, if the drainage is good.

CLINICAL CASES.

Case 1.—Mrs. H. C., aged 39 years, born in Norway, married.

Diagnosis.—Bilateral atrophic rhinitis with chronic ethmoiditis and sphenoiditis and a traumatic perforation of the septum.

Operation.—Radical exenteration of the ethmoid labyrinth and sphenoid sinus on the right side, leaving the left as a check.

History.—Family history negative. Pain general over the head and face for five years. Profuse discharge from the nose for two years. Has had several previous nasal operations.

Examination.—The entire nasal septum is destroyed to the ethmoid plate, leaving a large central perforation. Both inferior turbinates are shrunken and covered with crusts. Part of the middle turbinate remains. There is a large opening on either side of the cribriform plate. An X-ray shows double ethmoid clouding. The left frontal region is unsatisfactory. Thick scabs are general over both sides, and underneath there is a fetid purulent secretion.

Operation.—September 16, 1911. Dr. Emerson. Owing to previous operations, the landmarks are destroyed. There is some difficulty in locating the agger nasi cell. The ethmoid region between the posterior ethmoid cell and the anterior is one solid bony mass, with the wall too thick to penetrate safely. The anterior and posterior region was thoroughly opened and the remains of the turbinate removed.

Operation.—February 12, 1912. Dr. Emerson. Exenteration of the left ethmoid labyrinth and sphenoid under ether. Polypi in left posterior ethmoid cell removed. Partial remains of the right anterior sphenoidal wall removed.

Result, March 23d.—The right side has been free from crusts and odor for two weeks. The left side has some free pus, especially in the region of the nasofrontal duct and cribriform plate. Some headache on the left side.

Note.—This case was followed at the writer's office for some weeks until he was convinced that there was trouble in the left frontal sinus. This was uncertain from the X-ray plate. A Killian operation was then performed, which showed that the ethmoid cells extended out of the orbit and that there was a large cell in the crista galli. The frontal sinus was full

of granulations, and considerable pus was seen coming from the cell in the crista galli as well as from the sinus. Such a case could not be drained intranasally.

Result.—The right nose has been clear for months. The left has a few drops of clear pus coming from the frontal sinus.

Case 2.—A. H., born in Ireland, aged 26 years, domestic, single.

Diagnosis.—Bilateral atrophic rhinitis with chronic ethmoiditis and sphenoiditis.

History.—Family history, one brother has bilateral ethmoiditis. Mother and one sister has goiter. No specific history. Measles at nine years. Frequent colds and discharge from the nose for five years. Pleurisy four years ago for a week. Occasional headaches. Odor from the nose has made it difficult for the patient to retain her position as a domestic. She is not strong and tires easily.

Examination.—Patient poorly nourished. Cheeks flushed and tongue coated. Alæ flattened. Septum deflected to the left. Whole outer nasal wall on both sides covered with a thick crust that can be removed with nasal forceps en masse. Under this a bleeding surface and free stinking pus. Report from the Boston Consumptives' Home showed lungs and sputum negative.

Operation.—Exenteration of ethmoid cells and anterior sphenoidal walls.

Result.—Patient was treated at intervals for a year, as the ethmoid region was exenterated at intervals under local anesthesia. For two years the patient has been entirely well, with no odor or dryness, and the mucous membrane is clean. The sphenoidal openings are large and clean. She has gained twenty pounds and has used no wash for a year.

Note.—During the last year the patient has been treated only twice, following an acute infection. This patient was one of the most marked cases of ozena, and she now shows a perfectly clean nose without the use of any wash.

Case 3.—A. E., aged 32 years, born in Russia, grocer, married.

Diagnosis.—Bilateral atrophic rhinitis with chronic ethmoiditis and sphenoiditis.

Operation.—Radical exenteration of the ethmoid celis and anterior wall of the sphenoid under ether.

History.—Family history negative. Patient referred for an examination for a possible focal infection as a cause of his endocarditis. There is crusting and discharge from the nose with loss of smell. Duration, seven years. He has been to several hospitals, and was told that his disease was incurable. He is weak and finds it difficult to do his work.

Examination.—Crusting over both outer walls of the nares, with very offensive discharge underneath. The second turbinates are shrunken. A large quantity of free pus is seen in the right middle meatus. The bridge of the nose is somewhat depressed. The septum is deflected to the left at the upper third. The right sphenoid cavity is very large, the left nearly obliterated.

Result.—The tendency to crusting stopped in two weeks. There was persistent discharge from the region of the right sphenoid until it was discovered that there was a partition in the sinus with a narrow vertical ostia close to the septum, leading into the main cavity, which had not been opened. The partition was removed and the cavity irrigated; then treated with silver nitrate 8 per cent. Further trouble was experienced by the tendency of the margin of the anterior wall to fill in with granulations. Finally, by the use of silver nitrate and trichloracetic acid to the margin, this was overcome and the cavity remained permanently open and the discharge ceased.

Case 4.—H. H., shoemaker, married, born in Russia, aged 31 years.

Diagnosis.—Bilateral ethmoiditis and sphenoiditis with ozena. L. O. M. S. C.

History.—Severe headaches for eight years. (The writer had performed a radical mastoid on the left side, and in doing the dressings the foul, sour odor from the nose was very marked.

Examination.—Both nares contain a considerable amount of foul pus with crusting. The middle turbinates are boggy and myxomatous at their anterior ends. Anosmia complete.

October 18, 1912, both ethmoid labyrinths were exenterated from before backward, under ether. Both anterior walls of the sphenoid were removed and the two cavities connected.

October 20, 1912, nose clean and no perception of odor.

October 31, 1912, patient discharged from the hospital and treatment continued at the writer's office.

November 10, 1912, discharged.

Result.—The patient moved to Michigan and was treated there four times, as the nose was not completely healed.

April 22, 1913, examination by the writer showed the nares free from crusts or discharge. Both sphenoid cavities are widely opened.

Case 5.—A. M., born in Nova Scotia, aged 44 years, married, furniture mover.

Diagnosis.—Bilateral atrophic rhinitis with chronic ethmoiditis and sphenoiditis. Exenteration of the ethmoid cells and the anterior walls of the sphenoids. Local anesthesia.

History.—Family history negative. No specific history obtained. Malaria fourteen years ago. Several attacks of otitis media. Dryness of the nose and crusting with loss of sense of smell for twenty yers.

Examination.—The middle turbinals are covered with dry crusts and also the postnasal space. The nasal cavities are wide. The turbinals are atrophied on both sides, including the middle and inferior. The mucous membrane is pale and dry. There are several erosions on the septum.

Result.—This case was one representing the socalled terminal stage of ozena, and responded quickly to operative measures. For four years there has been no nasal symptoms.

Case 6.—C. N. C., Irish-American, born in Ireland, aged 53 years, married, news agent. First seen November 18, 1908.

Diagnosis.—Bilateral atrophic rhinitis with chronic ethmoiditis and sphenoiditis.

Operation.—Radical exenteration of ethmoid and sphenoid sinuses under ether.

History.—Family history negative. No specific or tubercular history obtained. Catarrh for ten years, with nasal obstruction and loss of smell. Colds often. Hacking cough. Postnasal discharge. Patient spends a long time each morning trying to get his nose free from crusts. Indigestion with chronic bronchitis and bronchorrhea for ten years. Aprosexia and neurasthenia marked. Odor pronounced.

Examination.—Face pale and pinched. Nose small and

alæ flattened. Septum to the right. Inferior turbinates atrophied. Right middle turbinate large and covered with dry secretion. The left middle turbinate shows myxomatous degeneration, and there is a polyp between it and the outer wall. Erosion on the septum. Pharynx atrophic, glazed and dry.

Result.—Following a radical exenteration the crusts and odor disappeared, and for two years there have been no nasal symptoms.

Case 7.—M. F., Irish-American, born in Boston, aged 20 years, female, single, brushmaker.

Diagnosis.—Atrophic rhinitis with chronic bilateral sinusitis of ethmoid and sphenoid.

History.—Family history negative. No specific or tubercular history. Pneumonia ten years ago. For four years the patient has had headaches on rising, especially over the right eye. Colds often. She has been under treatment at various hospitals for four years. Sense of smell lost; occasional epistaxis. Odor marked. General condition fairly good.

Examination.—Alæ flattened, septum is deflected to the left. Both inferior turbinates are covered with crusts. Right middle turbinate very large. Much mucopus in the middle meatus. Mucous membrane, where it is not covered with crusts, is dry and the nose obstructed. Pharynx dry.

Operation.—Exenteration of ethmoid cells and anterior wall of the sphenoids under local anesthesia. Os planum on the right side is partially destroyed.

Result.—Patient has been seen at frequent intervals for a year. For the last two years she has been entirely well, with no nasal symptoms.

Case 8.—G. B., American, born in Vermont, aged 25 years, married, advertising manager for a machine company.

Diagnosis.—Atrophic rhinitis with bilateral sinusitis of ethmoid and sphenoid.

Operation.—Exenteration of ethmoid and sphenoid sinuses, under ether.

History.—Family history neagtive. No specific history obtained. Frequent colds. Loss of smell. Nose obstructed and dry for ten years. Scarlet fever as a child. Pneumonia ten years ago. General pressure symptoms over the entire head. Muscular weakness. Aprosexia. Odor marked.

Examination.—General condition poor. Face pale. Alæ flattened and dilated. Odor marked. Septum deviated to the right with a horizontal ridge and posterior spur. Both outer walls of the nares are covered with crusts, which bleed on removal. Middle turbinals swollen and ulcerated. Much mucopurulent discharge, especially in the posterior nares. Pharynx dry and glazed.

Result.—This case was much improved, but on account of the fact that he lived in an adjoining state, and could not be seen except at long intervals, he is far from being cured. Since treatment was stopped there has been no crusting or odor, but there is considerable purulent discharge, which the patient can remove by using a nasal wash.

CONCLUSIONS.

The illustrative cases of ozena here presented are only a few out of a large number seen by the writer during the last ten years. The study of these and similar cases has led to the belief that ozena is the sequel of a focal infection.

Clinically the course of events is as follows: A septal deviation causes a compensatory hypertrophy of the middle turbinal. This is followed by a chronic catarrhal ethmoiditis which interferes with drainage to such an extent that a subsequent active infection results in a sinusitis.

The fetor and crusting are probably due to the direct action of a specific pus producing organism on the tissues, without any preceding true atrophic process.

The difficulty in establishing free drainage, where there is an abnormal anatomic development of the bony cells, makes the cure of certain cases of ozena impossible with any intranasal procedure.

Whatever aid bacteriology may give us in curing this disease must follow the free drainage of all foci of infection.

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XVII.

INTRANASAL TREATMENT OF MECKEL'S GANGLION.*

By E. M. Holmes, M. D.,

Boston.

The treatment of the sphenopalatine as well as that of the Gasserian ganglion is almost always for the relief of severe neuralgic pain. It consists of removing the ganglion by an operation which is necessarily extensive and associated with considerable danger, of injecting some drug into the substance of the gland, or of making application through the nose to the mucous membrane overlying the area of the ganglion.

As it is of considerable importance in our present study, it seems advisable that we briefly review the history of the subject. In early medical literature we find much concerning the treatment of cranial and facial neuralgia. Practically every drug known at the time was tried and lauded by some writer. The hot iron, the wet and dry cup and cantharides were extensively used, but rarely with marked or permanent results. There have always been cases more or less self-limited which, with or without treatment, have ceased and never returned. It is not the purpose of this paper to consider the major surgical treatment, and practically nothing was accomplished except by major surgery until in the early seventies. In 1874 Bartholow reported considerable success by injecting chloroform into the nerve structures. In 1884 Billroth began injecting osmic acid. He made repeated injections through the skin without exposing the nerve. About the same time Neuber and Eulenberg adopted very similar methods. In 1889 Bennett began exposing the nerve trunks by blunt dissection and injecting directly into the nerve structures a ½ to 2 per cent aqueous solution of osmic acid. Wright, Murphy and others were heartily in favor of Bennett's methods, and advocated

*Read before the American Laryngological, Rhinological and Otological Society, Washington, May 10, 1913.

their trial before resorting to major surgery. Schlosser was the first to record the injection of alcohol into the nerve trunks and ganglia for the relief of pain. He began his investigations about the year 1900. Baudoin, Ostwalt, Levy and others, after much experience, were quite enthusiastic about the alcoholic injection into the ganglia. Dr. Sluder was the first to attack the sphenopalatine fossa through the nose. He tried various obtunding drugs in connection with the alcohol he injected, in order to avoid the excruciating pain which almost always followed the use of the alcohol alone. He finally adopted a 5 per cent carbolic alcohol, and this is the solution I have used in all of my cases. Dr. Sluder's work was very painstaking and thorough, and it was due to his paper upon this subject that over two years ago I began injecting the sphenopalatine fossa through the nose under the guidance of my nasopharyngoscope. By the aid of vision the method is so simple and exact, the discomfort to the patient is usually so slight and the results are often so gratifying, that I now report the findings of the work to this society.

In this paper we have to consider two quite distinct classes of symptoms. First, the true tic douloureux, the distinguishing diagnostic symptom of which is a paroxysmal intense burning, cutting pain, lasting from a few moments to a minute or more. It may occur without known cause or it may be precipitated by various stimuli, as opening the mouth, swallowing, talking, sneezing and touching the face. A draught of air or a loud noise may bring on an attack. There may be from one to fifty attacks in a day. The attacks may follow day after day for years, or there may be periods of relief. There may be tenderness over the nerve foramina. In some cases there are vasomotor disturbances, flushing of the skin, hypersecretion of the nasal mucous membrane, salivation and lacrimation. The second class of cases is quite different in character. It includes the severe acute recurring hemicranias, the chronic almost constant hemicranias, the facial neuralgias and the deep boring suboccipital pains. A patient may be subject to one or all of the symptoms of the first class, to one or all of the symptoms of the second class, or symptoms of the two classes may be present at the same time. In this series some came with symptoms of the first class, some with symptoms of the

second class, and some presented symptoms of both classes at different times or at the same time.

As regardless of symptoms there has been relief by the treatment of Meckel's ganglion, until we possess more definite knowledge, we can clinically, from the standpoint of treatment, consider them collectively. The important questions from the patient's standpoint are: What are the chances of relief? How severe are the treatments? How many treatments will be necessary to produce a cure or to receive the greatest possible relief, and how much danger, if any, accompanies the treatment? It will be seen by reviewing the history of the cases here reported that we can gain much knowledge, both as to the etiology and to the prognosis of treatment, by the application of a strong solution of cocain over the area of the sphenopalatine ganglion, for of the twelve cases relieved temporarily by the cocain, ten were later apparently cured by the alcoholic injection; and of the thirty-four cases not relieved by the cocain, only eight were cured and six were more or less relieved by the alcoholic injections. In the majority of the cases there has been, as a rule, slight if any pain during or after the injection, and therefore there has been but slight shock following the treatment. As yet we cannot answer the third question, for perhaps one injection may give permanent relief, or two or three injections may give no relief, while the next injection may give permanent relief, or may give relief for a short or a long period. A first injection may give relief for a few days, and a second may last for a few weeks, while a third may last for months and perhaps for years. It seems justifiable and proper to follow injections as frequently as symptoms recur until the condition is relieved. If there were no improvement after three injections, I would be inclined to consider the case hopeless, so far as alcoholic injections were concerned. We are, however, not in a position to positively state that a case is hopeless, even though three or four injections have been followed by no relief. Until I had treated my thirty-seventh case I had believed that there was probably no danger connected with the operation, but the alarming hemorrhage which began in this case on the fifth day following the injection, and coming, so far as we could learn, from or near the area of the injection, teaches us that we must not look upon the procedure too lightly. It is possi-

ble that this will not again recur in a thousand cases, but until I have found it absent in a very large number of cases, I shall always consider it, and probably may be inclined not to treat some who, though not suffering severely, ought to be given relief.

Before injecting Meckel's ganglion the nose and epipharynx should be carefully cleansed. The patient's head should be covered by a sterile rubber cap or towel. The face should be washed with alcohol. There should be in readiness a fresh sterile ½ per cent solution of cocain, a fresh sterile 40 per cent solution of cocain and a sterile Meckel's syringe filled with a 5 per cent carbolic alcohol solution. The nasopharyngoscope should be cleansed with alcohol. Although I have as yet not seen signs of sepsis in any of these cases, yet as it takes but a few minutes to carry out antiseptic measures, they, if not efficient, can do no harm and seem advisable.

After cocainizing the lower fossæ of the nose with the weak solution the nasopharyngoscope should be inserted into the side of the nose opposite to the ganglion to be injected, and should be pointed toward the side of that ganglion. The position of the ganglion, which varies somewhat, is approximately under the area just at the end of the middle turbinate, and at this place are almost always two or three small blood vessels seen emerging from the sphenopalatine fossa. A cotton tipped applicator soaked in the 40 per cent cocain solution is now passed through the same side of the nose as the ganglion we wish to treat, and when the tip is over the area to be attacked, the applicator should be held firmly in place. The nasopharyngoscope can now be removed and the applicator remain in place for five or six minutes. If the application has been made during an attack, we may learn much by the effects upon the symptoms. If the pain ceases or is much relieved, we are more likely dealing with a diseased or excitable ganglion, and in this case the chance of relief or cure is greater than when the cocain has no effect upon the symptoms. Some cases, however, which are not relieved by applications, are relieved or cured by the alcoholic injection. We are, therefore, I believe, justified in injecting all cases which are of the type suggesting ganglion disturbance.

After sufficient time has elapsed to thoroughly anesthetize the area through which the needle is to be inserted, the naso-

pharyngoscope should be again passed into the opposite side and the sphenopalatine area brought into view. My Meckel's ganglion or some other suitable syringe should now be passed through the side of the nose corresponding to the ganglion to be treated. The needle must be concealed within the canula. The canula tip must be directed by the aid of the nasopharyngoscope until it is in contact with the area into which the needle is to be thrust. It should be pointed outward and somewhat upward. The canula must now be firmly held and the needle pushed through it to the desired depth. When we feel that the needle point is in in the desired position, the alcoholic solution can be injected. I begin with two drops at the first injection and increase the amount a drop at following injections. Six drops is the most I have used at any time. Following the injection in some cases there is for a few seconds to a minute or two pain, which is frequently followed by a numbness in the face and in the palate. Some cases have no pain following the injection, some have immediately a numb tingling sensation in the face, and others show no effects at the time, but show results after a few days. Among the failures there are likely many in which we are not successful in striking the ganglion.

All of the cases in this report are of a chronic type. Many of them give histories of a number of years' duration. Some of them are of intermittent character and have had periods of comparative freedom from pain. It will of course be necessary in the intermittent cases that considerable time elapse before we can consider them as cured. I am including all cases in this study, for a number of them in this latter group were extremely intense during the attacks, and in some the attack was almost immediately relieved by the treatment.

In all there are forty-six cases, and the time limit will not allow us to report them individually or at all fully. It has therefore seemed advisable to give a general summary of the treatment and results, and to append sufficient of the case histories to illustrate some of the more important conditions. There were thirty-one females and fifteen males. The oldest patient was a woman 74 years of age. The youngest was a boy 17 years of age. The average age was a little over 41 years. The first case treated was about twenty-six months ago, and the last case was treated over two months ago. The

number of injections in each case varies from one to nine, and the average for the series is just over three. Of the cases which were relieved by applying cocain 40 per cent solution over the area corresponding to the location of Meckel's ganglion (twelve in number), ten were relieved by the alcoholic injection and two were not relieved or in the least affected. Thirty-four cases were not relieved to any degree by the application of cocain to the area of the ganglion. Eight of these, however, were cured by the injection and six were more or less relieved. There were twenty-two cases which were not relieved to any marked degree by the injection. It is hardly fair to the treatment to give these failures without a few words of explanation, for some of them do not belong to this classification, but were treated experimentally, hoping to give relief to severe suffering. I do not believe now that injection of the ganglia was contraindicated in these severe cases, for the chance of giving relief to a distressing condition far outweighed the slight chance of untoward results. Among the relieved were eight cases of true tic. Five cases presented mixed symptoms, and eleven cases suffered with neuralgic pain not of the sharp, darting type. Of those unrelieved, there were three chronic suppurative sphenoid cases, four postoperative frontal sinus cases, two syphilitic necrotic cases, one glioma of the hypoglossal nerve, one calcareous degeneration of a second superior molar, and one case suffering severely from cicatricial contractions following an enucleation of a tonsil some three years previously. This last patient had been operated upon by a competent laryngologist, but evidently sepsis followed, resulting in very marked deformity. By plastic operations I was able to relieve the marked deformity, but there remained a constant painful dragging sensation. The first injection gave temporary relief, but following injections gave no results.

Although it is impossible to give a full report of all the cases, it seems advisable to append the histories of a few, as it will give a better understanding of the subject that I can by any general remarks.

No. 6 came to me first in June, 1910. She was 73 years of age and had suffered for a number of years with neuralgia. For two years she had been an almost constant sufferer with frequent intense jabbing pain, worse in the left side of the

inferior jaw. She had been unable to eat without precipitating an attack. Her sleep had been greatly disturbed. She was emaciated and had a very haggard appearance. She had taken various drugs without relief. Hot applications to the affected area and absolute rest seemed the only measures which gave any relief. I at first tried injections into the mental foramen and into the nerve trunks, but without any apparent result. She suffered severely until February, 1911, when I injected carbolic alcohol into the sphenopalatine area. She complained of a steady pain for several hours and then was absolutely free from any pain for three weeks, when the darting pains began. They were nowhere near as severe, but she was anxious for another injection. Another alcohol injection was made at this time and there was no pain until the last of September, six months after the last injection. Another injection was made and there has been no recurrence of pain. The patient has gained in every way and she is now as well as any one of her age.

No. 37, a woman 33 years of age, began having attacks of pain in the head in September, 1911. These attacks lasted several weeks and then subsided. In February, 1912, she began having attacks of severe neuralgia in the right side of the face. The pain usually started in the right cheek and darted toward the right ear and occiput. The pain was at times steady and at times was accompanied with severe cutting, burning thrusts. Before having any trouble with pain she had an attack of catarrh of the right side of the nose, accompanied with much thick yellow discharge. Examination showed a deflection of the nasal septum to the right with a sharp spur about two-thirds back, pressing into the middle turbinate. There was no sign of pus or hypersecretion of any description. As relief from the nasal deformity was demanded, I performed a submucous operation. For a while after this operation the pain seemed less and the improvement, though slow, was steady. In October the old symptoms became worse. The attacks became frequent, and on the 19th an injection of carbolic alcohol was made. On December 7th patient said pain was much less but was still annoying. Another injection was made, nothing unusual happening until five days later, when there was a protracted and rather profuse hemorrhage from the right side of the nose. Dr. French of Lynn, who first sent the patient to

me, was called and found a severe hemorrhage and the general signs which accompany considerable loss of blood. He was able to stop the severe flow by plugging the nose posteriorly and anteriorly. Even with these very tight plugs there remained a slight oozing. I saw the patient in consultation on the 14th. As there were signs of sepsis we tried to change the plugs. Great care was used in removing them, but the moment the anterior ones were removed the hemorrhage began. The blood was little different from colored water. Fresh aseptic plugs were immediately inserted. The patient was placed in a semiprone position and was given all the gelatin she would take. She remained in practical collapse most of the time until the 17th, when I again saw her. The plugs were of course getting very foul and had to be removed. The hemorrhage was the same as before. Only a moment elapsed before new plugs were in place. We had from the first considered transfusion as well as intravenous rabbit's serum. It was decided advisable to give rabbit's serum, and it was injected by the family physician. Two days later there was no oozing and the plugs were removed without any hemorrhage. We don't know what happened in this case, but can reasonably believe that the alcoholic injection was the exciting factor. There may have followed some necrosis which destroyed an arterial wall. We could prove nothing, for when we saw the case the hemorrhage was from a number of places, and when Dr. French first saw the case there was so much blood that he could not tell positively its origin. I am reporting this case as it is an important factor when considering this subject. A similar case may never again recur, but until a very large number have been followed we must not ignore this warning.

No. 24 is reported individually, as it illustrates a case showing all the symptoms of sphenopalatine neuralgia, but is really of another type. This patient, a woman 50 years of age, had been a sufferer for over twelve years. For a number of years there had not been a day when there had not been severe cutting pains starting on the left side of the nose and the left temple and radiating into the ear, the suboccipital region and into the neck. There had been several intranasal operations and there had been two major operations for the removal of Gasserian ganglion. The last operation was followed by facial paralysis and marked deformity, but with no relief from the

excruciating pain. There had been three injections of alcohol into the sphenopalatine area from the outside, but with slight, if any, relief. In August last I injected the sphenopalatine area intranasally. This gave some relief for a few days. In a month there was as much suffering as ever, and she informed me that there had always been a very sensitive point on the left side of the throat down by the roots of the tongue. Inspection showed nothing, but examination with the finger showed a small hard submucous growth which was extremely sensitive. Slight pressure was always followed by a paroxysm of severe pain. I endeavored to anesthetize with cocain and remove the tumor, but found it impossible. The patient was then admitted to the St. Elizabeth's hospital, and under ether I removed the growth, about the size of a pea. The pathologic report was that the growth was a glioma. Following this operation the attacks were less and less, and there has been absolute freedom during the past three months. This case was a failure so far as the injection of alcohol was concerned, for although the symptoms would place it as a sphenopalatine complication, the etiology was very different.

No. 31, a man aged 48 years, had for a year and a half been a great sufferer with tic douloureux. About five or six years before the attacks there had been a profuse discharge from the right side of the nose, but no marked nasal symptoms since. For over a year he had been treated by various men at various hospitals. He had also been treated as a private patient by several. He had been unable to receive any relief. The attacks were occurring every few minutes, so that he had been unable to perform any work for several weeks. Inspection by the nasopharyngoscope showed the area over the right sphenopalatine fossa somewhat more prominent than usual. It was more prominent than the left side. Although this was noted, we were not at this time impressed by the condition. After injecting the fossa and removing the needle there was a discharge of foul smelling pus. Exploration showed a general necrosis of the surrounding bone. A Wassermann of the blood was strongly positive. He was given salvarsan, and was somewhat relieved for three months, when the pain returned and was intense as before. I again injected the sphenopalatine area, and the attacks disappeared for three weeks, when the injection was repeated. After an-

other four weeks there had to be another injection. Since then there has been no return of trouble.

Although we have as yet not had sufficient experience to treat this subject as positively as it should be, both Dr. Sluder's experience and that gained from the observation of this series of cases proves that in a certain number of these distressing conditions we can temporarily give relief by applying strong cocain over the area of the sphenopalatine ganglion. In the cases thus relieved we may also expect marked results from the carbolic alcohol injections of the ganglion. Those cases not at all relieved by the cocain applications are not hopeless, for a few of them have been permanently relieved by the alcoholic injection. We have demonstrated that the procedure is a comparatively precise and as a rule painless one, and can be repeated a number of times if necessary. Our one case shows that alarming symptoms can follow this treatment, and therefore we cannot as yet use it in slight cases.

XVIII.

BRONCHOSCOPIC REMOVAL OF A COLLAR BUTTON AFTER TWENTY-SIX YEARS' SOJOURN IN THE LUNG.

By Chevalier Jackson, M. D.,

Pittsburg.

Bronchoscopic removal of foreign bodies are now so common that they scarcely merit publication, but the case herein reported presents unusual features.

Mrs. C. K., aged 48 years, admitted to the Presbyterian Hospital, with a history of having "swallowed" a pearl collar button twenty-six years previously. There was some cough and bloody expectoration at the time of the accident and for about a year subsequently. This was before the discoveries of bronchoscopy and roentgenoscopy. No further pulmonary symptoms were noted for twenty-four years. During the twenty-sixth year there was an atatck of "pneumonia," in treating which the attending physician (a very competent man) ridiculed the patient's idea that the button could still be in the lungs. In the early part of the twenty-sixth year, under care of a third physician, a second attack of pneumonia occurred, followed by a pain in the left side, bloody, foul expectoration, fever and emaciation. Again the patient's story of the collar button was ridiculed. Extremely feeble and emaciated, she fell into the hands of Dr. S. B. Pierce of Johnetta, Pa., who at once, on the physical signs, made a diagnosis of lung abscess and pyopneumothorax. Suspecting foreign body origin, he referred the case to me. On admission to the Presbyterian Hospital the woman's temperature was 102,° pulse 140, respirations 40. Sputum was profuse, thick, foul and of dark gray color. A radiograph (Fig. 1) by Drs. Johnston and Grier showed a dense shadow over the left lung, which they believed to be pus. Dr. John

W. Boyce corroborated Dr. Pierce's findings, and urged immediate drainage of the pleura by rib resection and a wide opening. This was done by Dr. J. Hartley Anderson. Johnston and Grier then made another anteroposterior radiograph (Fig. 2), which showed that the pus was well drained. In further search they made a diagonal radiograph which showed a collar button between the heart and spine, in direct line with the stem bronchus of the left side. With the assistance of Drs. Patterson, McCready and McKee, without anesthesia, general or local, I passed a bronchoscope and found the inferior lobe bronchus occluded, just below the orifice of the upper lobe bronchus, by a cicatricial mass containing three apertures through which reddish granulations, that bled when wiped, were protruding. Clearly, dilatation, as practiced in previous cases, was useless, and with the accurate localization and advice of Dr. Johnston as a guide, I excised tissue until a rather large cavity full of granulations was reached. I excised the granulations and wiped away blood, foul pus and secretions until the collar button (Fig. 3) came into view, bedded in granulation tissue, from which it was readily removed. The foul odor disappeared in about four weeks, cough and expectoration lessened, and both have now disappeared. The lung has filled with air and the woman is well.

The points of special interest are:

1. The extremely long sojourn of the foreign body in the lung; the longest, I believe, yet recorded.

2. The freedom from symptoms after the first year, for so long a period, twenty-four years.

3. The bursting of a foreign body abscess into the pleura, while doubtless not of the greatest rarity of occurrence, has been recorded in only a few instances.

4. The foreign body did not follow the discharging abscess into the pleural cavity.

5. The necessity of the most expert ray work is imperative. It was only the lateral radiograph that could show this foreign body, and ordinary work would have been negative.

6. The necessity in such cases of draining pus collections in order to get a radiograph of a foreign body, which would not show through the purulent shadow.

7. The feasibility of endoscopically removing a tissue barrier in order to reach an abscess cavity in the lung, when guided by both an accurate radiographic localization and ocular evidence that the tissue to be removed is pathologic.

8. The advantage of working without an anesthetic. This patient was in extremis and an anesthetic was not to be

FIGURE IV.

Glass collar button removed from the lung by bronchoscopy bloodlessly through the mouth without any anesthesia, general or local. The collar button had been in the lung for twenty-six years.

thought of. Moreover, it was no more painful than the filling of a sensitive tooth cavity, for which no one requires an anesthetic. Furthermore, the air passages were full of pus mixed with blood from the granulations. The coughing of the unanesthetized patient greatly assisted in removing this in the way I have often elsewhere explained.

FIGURE I.

Radiograph showing left pyopneumothorax which was due to the bursting into the pleura of a foreign body abscess of the lung in a woman of forty-eight years. Collar button was in the lung, but did not show through pus shadow.

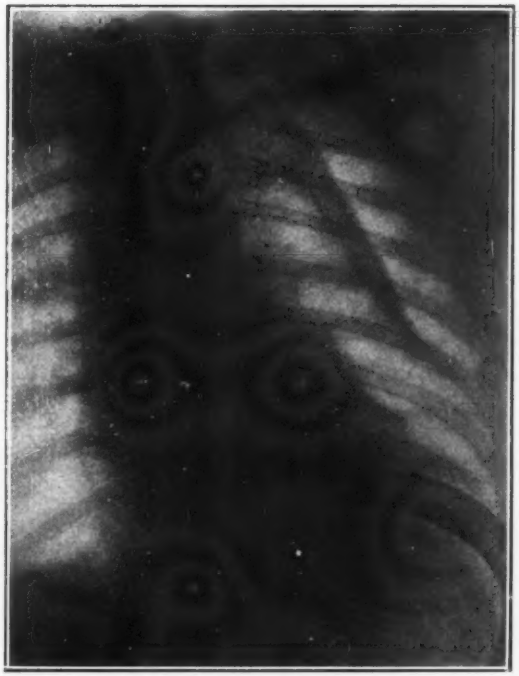

FIGURE II.

After external drainage of the abscess by Dr. J. Hartley Anderson, foreign body (collar button) present did not show. The dark line from the first rib downward and outward toward the drainage tube is the thickened visceral pleura seen on edge. The lung is collapsed as far as the pleural adhesions will permit.

FIGURE III.

Quartering lateral radiograph by Dr. George C. Johnston, showing collar button in the lung between the heart and the spine.

XIX.

THE COMBINED LABORATORY AND X-RAY INDICATIONS FOR THE MASTOID OPERATION.*

By George Sloan Dixon, M. D.,

New York.

For many years it has been the routine practice in the Eno Laboratory of the New York Eye and Ear Infirmary to examine smears from the aural canal in every case of suppurative middle ear disease, acute or chronic, admitted to the wards. For a short time cultivations were made, but these were soon abandoned, as the germs present in the canal are always mixed, and much time was wasted in separating them. As the mastoid pus in cases coming to operation was also examined, comparison showed that the predominating germ in the canal was found in the mastoid pus with sufficient frequency to make it a good rule to regard the predominating germ in the discharge from the middle ear responsible for the mastoid involvement, and we have found no good reason to change this view. For example, it is the rule to find the predominating germ shown in the smear from the canal pus, in the pus from the middle ear, in practically pure culture in the mastoid pus, in the pus of complicating brain abscess, in the spinal fluid in cases complicated by meningitis, and in the general circulation in cases complicated by sinus thrombosis.

During the past eleven years we have made 5496 examinations of aural pus. Of these 26.6 per cent have been mixed infection; that is to say, a large number of mixed germs were present, and it was not advisable to charge the infection to any particular germ. The majority of these were chronic cases, and where a radical mastoid operation was done the mastoid smear usually showed mixed germs. Strep-

*Read before the Medical Association of Greater New York, February 17, 1913.

tococcus occurred as the predominating germ in 24.8 per cent; pneumococcus, 12.2 per cent; staphylococcus (aureus and albus), 7.4 per cent; streptococcus mucosus capsulatus, 4.8 per cent; spirillum of Vincent, 1.8 per cent. The remaining 22.4 per cent is represented by miscellaneous, negative, etc., among which are placed the bacillus pyocyaneus, diphtheria, tubercle, coli communis, Friedländer, etc.

The discrepancy as to the frequency of appearance of these various forms of infection, as compared with the reports of other workers, is only apparent, and is largely accounted for by the fact that no distinction has been made between acute and chronic suppurative otitis and their complications.

In the matter of the relative virulence of these various microorganisms, our experience leads us to regard the streptococcus mucosus capsulatus as standing first, streptococcus pyogenes next, pneumococcus third and staphylococcus fourth, in acute suppurative processes about the middle ear.

At this point I wish to reiterate a statement made a number of times, to which exception has been taken, and will probably be again, namely, that among the various microorganisms found in the middle ear the streptococcus mucosus capsulatus in a manner stands alone. It is the most insidiously destructive the otologist is called upon to combat. This time it is my desire to make the statement as plain and as emphatic as possible.

A case of acute purulent middle ear disease in which the infective germ is the streptococcus mucosus capsulatus will tend to recovery equally with other forms of serious infection, provided it is seen early and proper drainage established. It is not these cases particularly to which reference is made, though such should immediately put the surgeon on his guard. It is those cases which are neglected, or cases in which all the acute symptoms have subsided but the otorrhea persists and the streptococcus mucosus is present, to which attention is directed.

Such a case may lull both the patient and surgeon into a sense of surety against further unfavorable progress. The pulse and temperature may become normal, all pain and tenderness may disappear. The blood count may return to normal. The hearing may improve, but the otorrhea does not

cease, as a general rule. Cases of this nature demand at least an exploratory mastoid operation. As a rule, every day over two weeks' duration is an additional and increasing menace to the life of the patient.

CASES OF STREPTOCOCCUS MUCOSUS CAPSULATUS INFECTION.

Case 1.—A male, 22 years of age, in the service of Dr. Adams, was admitted to the infirmary August 10, 1910. He gave a history of having had pain in and discharge from both ears for about twelve days. He was under observation and ran a temperature ranging from 98° to 100° until September 14th (twenty-nine days), when he complained of headache, and next day he had a chill and the temperature rose to 103.2.° During the time he was under observation two blood counts and a blood cultivation were negative. Mastoid operation was done September 15th. The bone was found extensively necrosed, there was marked zygomatic development and all cells were filled with pus. The dura was exposed in the middle fossa. Meningitis occurred, and the patient died six days later.

Case 2.—Male, 39 years of age, in the service of Dr. Whiting, was admitted to the infirmary September 8, 1909. He gave the history of having "snuffed up salt water" two months before, which caused great pain and apparently rupture of the membrana tympani. This cleared up in about two weeks. His present attack began eleven days ago, with great pain but no discharge. Now has frontal headache. A Schwartze operation on the day of admission. An escape of pus followed the skin incision. A large perforation was found at the root of the zygoma, which was followed into the zygomatic cells. Bone was disintegrated and removed with a curette. There was also found a perforation through the dural plate into the cranial fossa. The patient died of meningitis five days later.

Case 3.—Male, 39 years of age, was admitted to the service of Dr. Kenefick, February 26, 1912, with a history of having had coryza for twelve days, with a violent headache on the left side. The pain became localized in front of ear, and he had a seropurulent otorrhea for twenty-four hours; had pain in the mastoid which gradually subsided, and all acute pain ceased. Examination on admission showed the right ear

normal. The left ear showed subsiding O. M. P. A. There was no drooping of the canal wall, but there was tip tenderness in mastoid. Had aphasia and other symptoms of temporosphenoidal abscess. The patient was operated, but he died two days later.

Case 4.—Male, 28 years of age, was admitted to the service of Dr. Bacon, November 4, 1910, with a history of his present illness having lasted three weeks. He had had discharge from right ear, headache and mastoid pain. Had steadily refused to enter infirmary.

When he came in, pus was found in the canal, there was an anterior perforation in the membrana tympani which was red and bulging, and there was sagging of the superior posterior wall of the canal. He had marked mastoid tenderness, temperature 105.6,° pulse 160, respirations 24.

Mastoidectomy was done same day. A large area of sinus and dura were exposed, which were covered with granulations and pus under pressure. The patient died of meningitis next day.

Case 5.—Female, 40 years of age, was admitted to the service of Dr. Kenefick, with a history of having had slight pain in the right ear followed by otorrhea two months previously. This continued for three weeks, and then apparently ceased. A week ago was seized with severe pain, had chilly sensations and temperature, but no discharge. When she came in the canal was red and dry, bulging of membrana tympani. The posterior superior canal wall was sagging. Myringotomy, followed by a profuse discharge of blood and pus. Next day, July 23, 1909, Dr. Yates did a Schwartze operation on the right side. The mastoid was found sclerotic—very few cells. The bone was soft about the sinus and was removed. A small area of dura in the middle fossa was exposed. Progress was uneventful and she was discharged August 2d. Six days later she was readmitted at night, with the history of having had severe headache, nausea and vomiting, also vertigo, and became comatose. When she came in her temperature was 104,° neck stiff, eye grounds normal. Spinal fluid contained streptococcus capsulatus. An exploratory operation was done the next morning and a thrombus removed from the right lateral sinus. The patient died of meningitis

next day, two months and nineteen days from the beginning of her ear trouble.

Case 6.—Male, 39 years of age, was admitted to the service of Dr. Dench, June 28, 1909, with a temperature of 104.° The history given was that five weeks previously had pain in the left ear; a week later it began to discharge. This continued for two weeks, then ceased entirely for a week. Later had severe pain for a few days until the drainage was reestablished. A Schwartze operation was performed the day of admission. The cortex was hard, there were few cells, and the bone was soft in spots. The cells present contained granulations. The sinus was exposed for about an inch. The wall was white, but there was free flow of blood when the sinus was opened. The temperature dropped immediately, and he was discharged in good condition, twelve days later, and ordered to the clinic for further treatment. At the August 16th dressing, which was six days after he had left the ward, there was a very slight hemorrhage, also one on the 20th a little greater, and on the 23d there was a gush of blood from the sinus. The patient was readmitted and sent to the operating room. After opening the old wound and exposing the sinus widely, pressure was applied and the patient was put to bed. The next day neuroretinitis was found on both sides, but he did very well until September 4th, twelve days after his second admission, when he began to run an irregular temperature. The blood counts at this time were practically negative, but four days later (September 8th) a positive blood culture was obtained—streptococcus capsulatus. The internal jugular vein was resected the same day, and a cultivation of the contents of the vein yielded streptococcus capsulatus also.

Further progress was rather uneventful until November 23d, an interval of eleven weeks after his internal jugular resection, when he was discharged, his pulse and temperature having been practically normal for over three weeks.

On December 10th, seventeen days after his discharge from the infirmary for the second time, he complained of not feeling well while in the clinic, and was directed to return that afternoon. The night of the 10th (that is, next day) word was telephoned to the infirmary that he had not been able to

return, as requested. Two days after this he was brought to the infirmary at 8:30 p. m. with meningitis. He was taken to the operating room and an attempt made to drain, but he died in four hours. The total duration of this case was from about the 24th of May to the 12th of the following December.

These few cases have been picked at random. They illustrate the point, and it is therefore unnecessary to tax your time and patience further. But we have records of plenty more of the same kind.

True, other forms of infection may be equally dangerous, as, for example, streptococcus pyogenes and pneumococcus, but in these there is little likelihood of such a complete cessation of symptoms, and the danger signals are pretty constant.

In cholesteatoma the finding of cholesterin crystals in specimens from the canal or attic may aid in the diagnosis, though it is generally possible to make a diagnosis without the aid of the laboratory; however, our services are occasionally useful. In our experience the microorganisms present in this form are of little importance, as a rule.

BLOOD EXAMINATION.

The blood count in simple acute mastoiditis will range from normal to 18,000, with an average of about 11,000 to 12,000 leucocytes. The polynuclear count may be as high as 80 per cent, but the average is about 70 per cent. A leucocytosis of over 20,000 generally indicates the presence of some complication, meningitis, for instance, while 25,000 or over is more likely to indicate pneumonia. A leucopenia may be among the first indications of typhoid fever as a complication. We have, however, seen a leucocyte count as low as 4,200 with a polynuclear count of only 48 per cent in meningitis, but this is unusual.

Eosinophiles and mast cells are generally absent in cases of acute mastoiditis.

The blood count may be an excellent indication of the resistance of a patient or the onset of complications, but gives little information of the condition of the mastoid itself.

The time at our disposal will not permit of considering the

complications of mastoiditis, but we may say a word about blood cultivations. In blood cultivations we have an excellent means of determining whether the patient is suffering from bacteremia or not, and a positive cultivation in the presence of middle ear suppuration may be taken as good evidence of thrombosis of the lateral sinus, provided all complications of a suppurative nature below the neck can be eliminated. It has been stated that meningitis will occasionally give a positive blood culture. This may be true, but no case of meningitis coming under our observation has yielded a positive blood culture where implication of the lateral sinus could be excluded.

RADIOGRAPHY.

If any advantage is to be derived from mastoid radiography, we must of course have some knowledge of the variations in the normal mastoid process. We all know that a mastoid process may contain pneumatic cells of the medium, small or large type; that the small cells are in the upper, and the large cells in the lower mastoid, as a rule; that we may find coarse or fine diploetic bone, or solid bone throughout, only the aditus and antrum being present to be regarded as pneumatic spaces, and sometimes they are exceedingly small. Finally, the cortex may be very thick or very thin, and combinations of any two or all of the varieties may occur on one or both sides, except that the cortex is more likely to be the same on both sides. The size and shape of the mastoid are likely to be symmetrical.

Mr. Cheatle exhibited an interesting series of one hundred and twenty paired temporal bones at the Ninth International Otological Congress, held at Boston last August, and his demonstration was very valuable, particularly from the radiologist's point of view.

For instance, the right lateral sinus is usually larger and further forward than the left, and further forward in diploetic than in cellular bones; but in his series 21 per cent showed the groove larger on the left, and 64 per cent of these were males. In other respects there were exceptions, but not a sufficient number to change the rule. In any event, for our purpose it is not so much the size of the sinus as the depth of the groove and the prominence of its anterior margin.

More important is the fact that 16.6 per cent of these bones showed the diploetic infantile type on one side only. The total cellular asymmetry was 31.6 per cent, the other 15 per cent being of asymmetrical arrangement and combination of cells and diploe in the upper and lower mastoid. Thus, speaking broadly, the mastoid process was symmetrical in 68 per cent of his specimens.

This bears in an important manner on radiography, and must be considered when reading the plates.

We are thus met at the outset with difficulties, but they are more apparent than real, and in practice we can often distinguish the fine lines marking a diploetic process as distinguished from an empyema which may have obliterated the cell outlines; but of course this is not always possible, for we are dealing with shadows, and not with what we ordinarily understand as pictures. We have noted a number of cases where the mastoid on one side was diploetic and of the pneumatic type on the other, the pneumatic side being the side involved, while there was no history of disease on the diploetic side.

In view of this, it may very properly be asked what we may reasonably expect in the way of information to be obtained from an X-ray examination of the mastoid.

First: It will show in the vast majority of cases the location of the lateral sinus, judged by the shadow of the anterior margin of the groove in its relation to the meatus, and its angle to Reid's base line, which is most important. If this shadow of the anterior margin of the groove is found to be at right angle to Reid's base line, the sinus has cut the petrous pyramid and must necessarily be very close to or immediately under the posterior canal wall, and as this angle decreases backwards the sinus is further and further from the canal. If it cuts Reid's base line at about 50 to 55 degrees it may be regarded as about in its normal position. The possibility of obtaining this information is alone sufficient to warrant an X-ray examination.

X-RAY CASES.

Case 924.—F. 42. Dr. E. B. Dench. Furunculosis with suspected mastoiditis on the left side. Skiagraph showed the mastoids diploetic on both sides with sinus far forward.

Three days later a simple mastoid operation was done. The sinus was found to be superficial and very close to the posterior canal wall. The mastoid antrum was explored through the canal, and no cells were found except at the tip.

Case 937.—F. 16. Dr. E. B. Dench. Left O. M. P. C. with furunculosis. Skiagraph showed a few small cells on the right side, with sinus in about the usual position. No cells were apparent on the left side, and the sinus was far forward. Left radical mastoid operation was done. The bone was found to be dense, and the sinus far forward.

Case 1206.—M. 23. Dr. E. B. Dench. Right furunculosis with suspected mastoiditis. Skiagraph showed the left mastoid having the appearance of being between a fine pneumatic and diploetic type. The cells which could be seen were well defined above and behind the canal, and could be traced to the tip. The right mastoid showed a few ill defined cells above and behind the canal, but could not be traced below the level of the canal. The lateral sinus on this side was observed to be about 15 degrees straighter than the left—that is, well forward. The whole mastoid was cloudy. Simple mastoid operation was performed the next day on the right side. The mastoid was reported as diploetic, with the sinus against the posterior wall of the canal. No free pus was found, but the antrum was filled with granulations.

Case 1503.—M. 34. Dr. Kenefick. Left O. M. P. A. Mastoiditis. Skiagraph showed both mastoid processes of large cell pneumatic type, the right clear, but the left cloudy throughout. Sinus fairly well forward and deep, being covered with cells. Four days later a simple mastoidectomy was done on the left side. The cells were found filled with pus and granulations, the sinus far forward and deep.

Case 1505.—M. 29. Dr. J. L. Adams. Left O. M. P. A. Mastoiditis. Skiagraph showed both mastoids of markedly diploetic type—no cells to be seen. The sinuses were far forward. Simple mastoidectomy the same day. The bone was found to be sclerotic. Sinus was extremely far forward, and just below antrum curved forward under posterior canal wall—almost in contact. Tip diploetic. Pus was found in the antrum.

Case 1563.—F. 10. Dr. W. S. Bryant. Right O. M. P. C.

Skiagraph showed the left mastoid to be of pneumatic type, moderate sized cell. Clear. Right showed only a few indistinct cells over sinus, which was far forward. Radical mastoid operation next day. No cells were found, the bone being diploetic. The bone was soft and full of granulations. The sinus was far forward.

Second: We may expect to learn the type of bone, the location of the large cells, whether the sinus is covered with cells or not, and the extent to which they have developed into the zygomatic region. If cells do not show on the diseased side and do show on the normal side, the chances are about three to one that the pathologic bone is of the same type. If no detail is found in the plate of the affected side, then the chances are about five to one that the mastoid is diseased; but the clinical symptoms must back up the plate.

Case 977.—M. Dr. E. B. Dench. Suspected mastoiditis. This patient had been walking about for some weeks. He was a man having important business connections, and it was quite necessary that he remain in harness unless an operation was absolutely necessary at that time. He was apparently convalescing from an O. M. P. A. right side, and was comfortable except for the discharge. Skiagraph showed left mastoid of large cell pneumatic type, and clear. The right was disorganized and appeared like a cavity on the plate and was so reported. Soon after this a mastoidectomy proved the findings as above.

Case 1024.—M. Dr. E. B. Dench. Right O. M. P. A. Mastoiditis. Had intranasal operation three months ago, and has had more or less ear trouble ever since. Skiagraph showed pneumatic mastoids on both sides. The right was cloudy. Sinus was not shown. Simple mastoid operation two days later. Free pus in tip cells.

Case 1090.—M. 22. Dr. R. Lewis. O. M. P. A. Mastoiditis right. Skiagraph showed both sides of the large cell pneumatic type. The right was very cloudy. Sinus in about the usual position. Simple mastoid operation was performed three days later. A cellular bone was found, the tip cells filled with pus.

Case 1349.—M. Dr. E. B. Dench. Left O. M. P. A. Deaf on left side for several years. Had a great deal of pain three

weeks ago. Paracentesis gave relief. No history of mastoid tenderness. The infection was mixed, streptococcus capsulatus being present. Skiagraphs showed right mastoid with small cells about petrous base and antrum. A large cell was shown about the middle of mastoid, divided by anterior margin of sinus groove. Left mastoid was cloudy throughout—dark where the cells of lower mastoid should be, and septa indistinct. Left simple mastoidectomy. Mastoid extremely pneumatic, with numerous large cells at tip full of granulations and pus.

Case 1351.—F. 20. Dr. Gorham Bacon. Left mastoiditis. Skiagraph showed mastoid of moderate sized pneumatic cells which extend high above canal. Left same type. The higher cells on this side very cloudy. The cloudiness shades off to tip. Simple mastoidectomy the same day. Free pus with granulations found throughout the mastoid, especially at antrum and tip.

Third: It is possible to diagnose perisinus abscess. I have been fortunate enough to diagnose one, hint at others, but have missed several. More experienec and improved technic should increase the number discovered. Epidural abscess should be diagnosed, if it is not in line with the sinus, in a small proportion of the cases at least.

Case 942.—M. Dr. E. B. Dench. Suspected mastoiditis. Skiagraph showed left mastoid process involved. The plates also showed the shadow of an epidural abscess distinctly, but this was not read before operation. Two days later simple mastoid operation was done. Thick and hard cortex was found. Free pus was found in antrum and tip. Epidural abscess over cerebellum.

Case 987.—F. Dr. E. B. Dench. Suspected empyema left mastoid. Skiagraph showed small pneumatic type of bone on both sides. A small spot in front and one behind the left sinus were thought to be cells. Operation next day demonstrated the two small spots to be perisinus abscesses.

Case 1235.—M. Dr. Gorham Bacon. Right O. M. P. A., suspected mastoiditis. The plates in this case were poor, but they showed the bone pneumatic on both sides. There seems to be destruction of bone behind the right antrum. Mastoid

operation was performed next day. Free pus and granulations were found, also perisinus abscess.

Case 1371.—M. 30. Dr. J. L. Adams. Double O. M. P. A. The plates showed the left mastoid generally diploetic throughout, except a few small cells above the antrum. About two-thirds down from the antrum is a large cell or abscess cavity, and a small one just above it. The sinus seemed fairly well forward, and not very deep. The right seemed mixed, finely cellulodiploetic throughout. The sinus could not be seen. Left simple mastoidectomy four days later. A large tip cell was found containing about a dram of pus. It was in contact with the sinus.

Case 1380.—F. 22. Dr. F. Whiting. Right O. M. P. A. Mastoiditis. The plates showed the mastoids of pneumatic type, the cells increasing in size downward and backward, the largest behind and below. The left showed sharp and clear. The right was cloudy. Will probably show a very large cell at the posterior lower margin of process and one overlapping posterior margin of sinus. The sinus seemed to be in about the usual position. Right simple mastoidectomy. Cortex soft. Large tip cell filled with pus. Perisinus abscess. Sinus covered with granulations. Small cells of tip, the zygoma and antrum filled with granulations.

Case 1474.—M. Dr. Bryant. Left O. M. P. A. Mastoiditis. Plates showed the right mastoid to be of rather small cell pneumatic type. Septa clear and distinct. The left was similar in type, but the septa were indistinct. The sinus was well forward, and the operator was asked to look for perisinus abscess above emissary vein. Operation was performed the same day. Tip cells were filled with pus. A large cell below led to epidural cerebellar abscess. The cells in zygoma contained pus. Small area of dura in the middle fossa and the sinus were exposed.

Fourth: Fractures of the mastoid process can be shown, but not invariably. Stereograms will aid in these cases.

Fifth: Faults in the canal wall and in the tegmen tympani and antri have, I believe, been frequently shown. We have shown two.

Sixth: Furunculosis of the canal gives marked symptoms of mastoid involvement in many instances. The diagnosis in

the vast majority of these cases can be cleared up by an X-ray examination.

Case 1343.—M. 41. Dr. Yates. Left furunculosis, suspected mastoid. Skiagraph showed only a few cells about the mastoid antrum and along the anterior border of the sinus, on right side. It showed the left finely diploetic, a little hazy, but if diseased only slightly. No cavities. The furuncle was incised and no further operation was necessary.

Case 1347.—M. 22. Dr. Kenefick. Left furunculosis, O. M. P. A., and suspected mastoid. Mastoid was diploetic on both sides. No evidence of mastoiditis was shown by the plates. Sinus was seen to be moderately well forward. The furuncle was incised and no further operation was required.

Case 1348.—F. 19. Dr. Kenefick. Furunculosis, suspected right mastoiditis. Skiagraph showed a rather small cell pneumatic type of bone on both sides. The right antrum was a little hazy. Sinus fairly well forward. The furuncle was incised and no further operation required.

Case 1367.—M. 10. Dr. Lewis. Right furunculosis. O. M. P. A., suspected mastoiditis. Skiagraph showed both mastoids of pneumatic type, and the right side clear. Furuncle incised, no further operation required.

The conclusions which can be properly drawn from these cases are quite plain. It is a safe rule not to make a diagnosis on one point, and this applies to X-ray findings in the mastoid as much as to anything else. But such an examination of the mastoid process is of great value, and this statement cannot be successfully challenged. It is backed up by the experience of radiologists and surgeons all over the country, many of whom have been working in this line a great deal longer than I have. Ordinary common sense must be used in reading the plates, and the findings should be supported by the clinical symptoms. Where the clinical symptoms alone are not sufficient for a diagnosis of mastoiditis, a positive plate will frequently supply conclusive evidence for immediate operation, as in case 977 just cited.

CONCLUSIONS.

If our experience at the New York Ear and Ear Infirmary teaches anything, it is that every case of acute suppurative dis-

ease of the middle ear should be skiagraphed, as well as many of the furuncular cases. Skiagraphs would also be useful where the radical mastoid operation is to be performed. Anything which will add to our knowledge of a case will increase the chances of the patient's speedy recovery.

In conclusion, it is not to be understood that the blood count, the form of infection, or positive X-ray findings alone can be relied upon to any considerable extent as determining the necessity for a mastoid operation. The clinical symptoms are all important; without them our modern aids are of little value, for intestinal disturbances will occasionally cause a comparatively high leucocytosis and a rather alarming percentage of polynuclear cells. We may have a rather violent streptococcus infection in the canal, or a pneumococcus infection which looks vicious in the smear, but both may recover after myringotomy, though there may have been considerable mastoid tenderness. A streptococcus mucosæ otitis media may eventuate in the same manner. Not infrequently the clinical symptoms are not sufficient to warrant surgical interference in this form of infection. When the acute stage has passed we may have none, no pyrexia, no pain, no tenderness, only the otorrhea remaining, or it may also have ceased. The blood count is frequently normal. Wait for further clinical symptoms in these cases, and the chances are greatly in favor of their indicating meningitis or sinus thrombosis when they do arrive, instead of a simple acute mastoiditis. A positive X-ray plate in such a case, taken in connection with the form of infection, settles the diagnosis and makes the mastoid operation imperative with as little delay as possible.

In either streptococcus or pneumococcus cases (though we believe more liberty can be taken with the latter, as a rule) the danger signal may be a sudden rise in the polynuclear count, with or without an increased leucocytosis, especially the latter. A positive X-ray plate will again settle the diagnosis, though the clinical symptoms may not alone be sufficient to indicate the mastoid operation.

Staphylococcus infections seem to allow more latitude than any of the other forms of infection, but these will give us plenty of trouble if the drainage is poor. The same applies here as to the streptococcus form of infection.

Finally, a certain number of cases will occur in which symptoms of sinus thrombosis may be the first indication that the time for operative interference has arrived. A positive blood culture in such a case will, of course, settle the diagnosis, provided other sources of infection of the blood stream can be eliminated.

The differential blood count in these cases is variable and cannot be regarded as affording any very positive assistance in the diagnosis, but a low leucocyte count and a high polynuclear percentage is suspicious.

XX.

OCULAR MANIFESTATIONS IN NASAL AND AURAL DISEASES WHICH PROBABLY INDICATE INVOLVEMENT OF THE SYMPATHETIC NERVOUS SYSTEM.*

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In recent years a great deal has been written about the ocular symptoms in both aural and nasal diseases, and below is given a brief summary of the many conditions which have been described by the various writers. It is unfortunate that there has been no definite system of differentiating the various symptoms, especially when considering the optic nerve. There is an absolute difference between optic neuritis and choked disc, and care should be taken not to describe the one when the other is really present. The writer has roughly grouped the numerous symptoms given, as follows:

1. Amblyopia, amaurosis, amaurotic amblyopia, scotomas, and contracted fields.

2. Discs: hyperemic, outlines pale and indistinct, congestion, margins of the nerve indistinct or hazy, with hyperemia of the disc.

3. Papillæ: white and atrophic without showing optic neuritis, prepapillary edema, papillitis.

4. Retina: retinitis, retinochoroiditis, edema of, detachment of, edema with exudate, swelling and tortuosity of the retinal vessels, vessels overfull, general edematous condition of the fundus, hyperemia of the arteries, pulsation of the arteries and veins.

5. Nerve: unilateral and bilateral neuritis, retrobulbar and perineuritis.

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*Read before the American Laryngological, Rhinological and Otological Society, Washington, May 10, 1913.

6. This includes punctate keratitis, vitreous opacities, exophthalmos, increased intraocular tension, edema of the upper lids, dilatation of the pupil, oculomotor paralysis, abducens paralysis, disturbances of lacrimation, photophobia.

In addition to these symptoms, pain is generally present, although it varies greatly in character. Dr. Sluder has also noted disturbances of taste, and has noted paralyses of the palate muscles, which are supplied by the superior maxillary branch of the fifth nerve. Intractable sneezing, profuse rhinorrhea, a tickling sensation in the palate, and areas of anesthesia have also been described.

Dr. Wolff Freudenthal has reported a significant case of angioneurotic edema of the face occurring in a patient upon whom he had previously operated for frontal sinusitis. Five years before operation she had suffered for a year with a profuse hydrorrhea nasalis of the left nostril only, which had not responded to treatment, but finally disappeared of itself. This was undoubtedly a case of true involvement of the sympathetic.

The relationship of the optic nerve to the postethmoidal cells and to the sphenoidal sinuses has been very thoroughly described by many, but very few have apparently noticed the intimate association existing between the fifth nerve and the sphenoids. Dr. Sluder and Onodi have also noted the proximity of the other orbital nerves to the sphenoid sinuses, and the possibility of their involvement in disease of the sinuses. The writer has never found these relationships, with the exception of the second branch of the fifth nerve, which is very frequently and extensively in contact with the sinus, both the sensory portion and the motor and the sympathetic, i. e., the Vidian portion, lying on a portion of the sinus where they would be more likely to be involved, if the sinus were inflamed, than the optic nerve itself. The writer wishes to add the sympathetic nerves to the numerous relations already noted, and to emphasize the very intimate contact that exists between these nerves and the bony walls of the sinuses. As the majority of the symptoms (ocular) are due to vasomotor disturbances, and as the sympathetic nerves are the vasomotor nerves, it seems to the writer that we have a most reasonable explanation for most of these manifestations, in that they are caused by irritation of this system. An examination of

the specimens will show how slightly any relationship can exist between the third, the fourth, the first branch of the fifth or the sixth nerves. They all enter the cavernous sinus external to the carotid artery (which latter extends the whole length of the sinus and lies on its inner wall), being covered by its endothelial lining membrane, except the sixth, which lies on the external wall of the artery. They all enter the orbit from this outer wall, passing through the common tendon of the orbital muscles, and the writer has yet to see a specimen showing any actual relationship of these nerves and the sinuses. With the second branch of the fifth, however, the relationship is very intimate,as said before, and the third branch is frequently in relation with the sinus, as can be seen on the specimens. Dr. Sluder even claims to have seen the Vidian nerve actually exposed in the sinus. The writer has never been satisfied with the various theories in explanation of the many ocular symptoms in these cases in which there are no intracranial complications, orbital abscesses, or even pressure within the diseased sinuses themselves. He has been unable to find any reports of microscopic proof of neuritis, except where meningitis was present. It is well recognized that increased intracranial pressure produces characteristic ocular disturbances, and optic neuritis, brain tumors, gummata, and subdural or brain abscesses are among the many things to be remembered and to be determined in our efforts to interpret the eye symptoms. The writer desires to speak only of those cases in which the ocular disturbances are relieved by treatment of the nasal sinuses. In order to fully appreciate the reasonability of the writer's views, a complete description of the anatomy and the physiology of these nerves is given below, being taken from Gray's anatomy and from Landois' physiology.

The third nerve anastomoses are: (a) On the cavernous sinus with the first branch of the fifth, receiving its sensory fibers supplying the iris; (b) with the sympathetic through the carotid plexus, and (c) indirectly with the sixth, whereby it receives its vasomotor fibers. It contains (1) voluntary motor fibers for all the orbital muscles except the external rectus and the superior oblique; (2) the fibers of the sphincter pupillæ, which are excited reflexly from the retina; (3) the fibers for the tensor choroideæ, which is the

muscle of accommodation. The two latter sets form the short root of the ciliary ganglion, and reach the eyeball through the ciliary nerves. This nerve controls the pupillary action associated with accommodation. Stimulation of this nerve causes contraction of the pupil, while paralysis causes dilatation of the pupil. It should be remembered that in paralysis of the third nerve the pupil will not contract, either for light or for accommodation, whereas stimulation causes contraction.

The fourth nerve anastomoses with the carotid plexus and with the first branch of the fifth. It supplies the superior oblique muscle.

In describing the fifth nerve, it should be borne in mind that the origins of its sensory root anastomose with the motor nuclei of all the nerves arising from the medulla oblongata, except that of the sixth, as this fact explains the vast number of reflex relations of this nerve. As it crosses over the superior border of the petrous portion of the temporal bone, it is in direct contact with the superior petrosal sinus. It then becomes enlarged as the Gasserian ganglion, and lies directly over the carotid canal of the petrous bone and receives sympathetic fibers from the carotid plexus. Landois says that it also receives fibers from the cavernous plexus. The following description of the first and second branches is given in full from Landois, and should be carefully studied:

I. The ophthalmic division receives sympathetic fibers (vasomotor nerves) from the plexus cavernosus; it passes through the superior orbital fissure (sphenoidal) into the orbit. Its branches are:

1. The small recurrent nerve which gives sensory branches to the tentorium cerebelli. Fibers—the vasomotor nerves for the dura mater—proceed along with it from the carotid plexus of the sympathetic.

2. The lacrimal nerve gives off (a) sensory branches to the conjunctiva, the upper eyelid, and the neighboring part of the skin over the temple; (b) true sensory fibers to the lacrimal gland. Stimulation of this nerve is said to cause a secretion of tears, while its section prevents the reflex secretion excited through the sensory nerves of the eye. After a time section of the nerve is followed by a paralytic secretion of tears, although the statement is contested by Reich. The

secretion of tears may be excited reflexly, by strong stimulation of the retina by light, by stimulation of the first and second branches of the trigeminus, and through all the sensory cranial nerves.

3. The frontal (f) gives off the supratrochlear, which supplies sensory fibers to the upper eyelids, brow, glabella, and those which excite the secretion of tears reflexly; and by its supraorbital branch (b), analogous branches to the upper eyelid, skin of the forehead, and the adjoining skin over the temple as far as the vertex.

4. The nasociliary nerve (nc), by its infratrochlear branch supplies fibers, similar to those of 3, to the conjunctiva, caruncula and sacculus lacrimalis, the upper eyelid, brow, and root of the nose. Its ethmoidal branch supplies the tip and alæ of the nose, outside and inside, with sensory branches, as well as the upper part of the septum and the turbinated bones with sensory fibers, which can act as afferent nerves in the reflex secretion of tears; while it is probable that vasomotor fibers are supplied to these parts through the same channel. (These fibers may be derived from the anastomosis with the sympathetic.) The nasociliary nerve gives off the long root (1) of the ciliary (c), and 1 to 3 long ciliary nerves.

The ciliary ganglion which, according to Schwalbe, perhaps belongs rather to the third than the fifth nerve, has three roots—(a) the short or oculomotorius; (b) the long (L), from the nasociliary; and (c) the sympathetic (s) sometimes united with b, from the carotid plexus. The short ciliary nerves (t), six to ten in number, proceed from the ganglion, along the long ciliary nerves, to near the entrance of the optic nerve, where they perforate the sclerotic coat and run forwards between it and the choroid. Tiedemann says that it also communicates with Meckle's.

Ciliary Nerves.—Physiologically these nerves contain:

1. The motor fibers of the sphincter pupillæ and the tensor choroideæ from the root of the oculomotorius.

2. Sensory fibers of the cornea, which are distributed as excessively fine fibrils between the epithelium of the conjunctiva bulbi; they perforate the sclera. These fibers cause a reflex secretion of tears (N. lacrimalis) and closure of the eyelids (N. facialis). Sensory fibers are supplied to the iris (pain in iritis and operations on the iris), the choroid (pain-

ful tension when the ciliary muscle is strained), and the sclerotic.

3. Vasomotor nerves for the blood vessels of the iris, choroid, and retina. They arise in part from the sympathetic root, and the anastomosis of the sympathetic with the ophthalmic division of the trigeminus. The iris and retina receive most of their vasomotor nerves from the trigeminus itself, and a few from the sympathetic direct.

4. Motor fibers for the dilator pupillæ, which for the most part are derived from the sympathetic, through the sympathetic root of the ganglion and the anastomosis of the sympathetic with the trigeminus. Some observers deny altogether the existence of a dilator pupillæ muscle. The ophthalmic division contains independent fibers for the dilatation of the pupil, which arise in the medulla oblongata and proceed directly into the ophthalmic or arise from the Gasserian ganglion.

After section of the trigeminus the pupil becomes contracted after a short period of dilatation (rabbit, frog), but this effect is not permanent. After excision of the superior cervical ganglion of the sympathetic, the power of dilatation of the pupil is not completely abolished. The narrowing of the pupil which follows section of the trigeminus in the rabbit, and which rarely lasts more than half an hour, may be regarded as due to a reflex stimulation of the oculomotorius fibers of the sphincter, in consequence of the painful stimulation caused by section of the trigeminus.

Stimulation of the Cervical Sympathetic.—Either in the neck or in its course to the eye, when the peripheral end of the cervical sympathetic is stimulated, besides causing constriction of the blood vessels on that side of the head, there is dilatation of the pupil, as well as contraction of the smooth muscular fibers (Müller's muscle) in the orbit and eyelids. The membrane of the inferior orbital fissure (sphenomaxillary fissure) in man has a layer of smooth muscle, one millimeter thick, and arranged for the most part longitudinally. Both eyelids contain smooth muscular fibers which serve to close them; in the upper lid they lie close under the conjunctiva. Tenon's capsule also contains smooth muscular fibers. The sympathetic nerve supplies all these muscles (the orbital muscle is partly supplied from the sphenopalatine

ganglion). Hence stimulation of the sympathetic causes dilatation of the pupil and of the palpebral fissure, with protusion of the eyeball. This result may be caused reflexly by strong stimulation of sensory nerves. Strong stimulation of the nerves of the sexual organs is followed by similar phenomena in the eye. The dilatation of the pupil which occurs in children affected with intestinal worms is perhaps an analogous phenomenon. The pupil is dilated when the spinal cord is stimulated (at the origin of the sympathetic), as in tetanus.

Section of the cervical sympathetic, besides other effects, notably those on the blood vessels on that side of the head and face, causes narrowing of the fissure between the eyelids and the eyeball sinks in its socket.

5. It is probable that trophic fibers occur in the trigeminus and pass through the ciliary nerves to reach the eye. If the trigeminus be divided within the cranium, after six to eight days, inflammation, necrosis of the cornea, and ultimately complete destruction of the eyeball take place, constituting panophthalmia.

Section of the trigeminus paralyzes the vasomotor nerves in the interior of the eyeball, which must undoubtedly cause a disturbance in the intraocular circulation. According to Jesner and Grünhagen, the trigeminus also contains vasodilator fibers, whose stimulation is followed by increased flow of blood to the eye, with consecutive excretion of the fibrin factors and increase in the amount of albumin of the aqueous humor. After section of the nerve the intraocular tension is diminished, while stimulation of the nerve is followed by increase of the intraocular pressure. This diminution of the normal tension necessarily must alter the normal relation of the filling of the blood and lymph vessels, and also the movement of the fluids upon which the normal nutrition is largely dependent.

There are three conditions on which the above changes may depend: (1) Mere loss of sensibility, which alone is not sufficient to explain the phenomena; (2) vasomotor disturbance, which is excluded by the above facts, and also by the other consideration that if the fifth nerve be divided and the superior cervical ganglion excised simultaneously, ophthalmia does not occur, and, in fact, excision of this sympathetic ganglion may modify the results of section of the fifth.

Thus we are forced to (3) the theory of trophic fibers, whose center is the Gasserian ganglion.

Pathologic.—In cases of anesthesia of the trigeminus in man, and, more rarely, in severe irritation of this nerve, inflammation of the conjunctiva, ulceration and perforation of the cornea, and finally panophthalmia, have been observed. This condition has been called ophthalmia neuroparalytica.

There are other affections of the eye depending upon disease of the vasomotor nerves, which are quite different from the foregoing, as they never lead to degenerative changes: such as ophthalmia intermittens (due to malaria); a unilateral, intermittent, excessive filling of the blood vessels of the eye, accompanied by the secretion of tears; photophobia, often accompanied by iritis, and effusion of pus into the chambers of the eye. This condition is regarded by Eulenburg as a vasoneurotic affection of the ocular blood vessels. Pathologic observations, as well as experiments upon animals, have shown that there is an intimate physiologic connection between the vascular areas of both eyes, so that affections of the vascular area of one eye are apt to induce similar disturbances of the opposite eye. This serves to explain the fact that inflammatory processes in the interior of one eyeball are apt to produce a similar condition in the other eye. This is the socalled "sympathetic ophthalmia." It is probably effected through Ribes's ganglion. Thus, stimulation of the ciliary nerves or the fifth on one side causes dilatation of the blood vessels, not only on its own side, but also on the other side as well. The pathologic condition of glaucoma simplex, where the intraocular tension is greatly increased, is ascribed by Donders to irritation of the trigeminus. (Increased intraocular tension may be produced by irritation of the secretory fibers contained in the fifth nerve, by stimulating the nucleus of the trigeminus in the medulla oblongata, and also reflexly by irritation of the peripheral branches of the fifth, as by nicotin placed in the eye. It is possible, however, that some forms of glaucoma are produced by diminished removal of the aqueous humor from the eye.) Unilateral secretion of tears, due to irritation of the ophthalmic division of the fifth, has been repeatedly observed, but unilateral cessation of tears, due to paralytic conditions, very rarely.

II.—Superior Maxillary Division.—It gives off

1. The delicate recurrent nerve, a sensory branch to the dura mater, which accompanies the vasomotor nerves, derived from the superior cervical ganglion of the sympathetic, and is distributed to the area of the middle meningeal artery.

2. The subcutaneous malar or orbital (o) supplies by its temporal and orbital branches sensibility to the lateral angle of the eye and the adjoining area of skin of the temple and cheek. Certain fibers are said to be the true secretory nerves for tears.

3. The dental, anterior, posterior, and median, and with them the anterior fibers from the infraorbital nerve, supply sensory fibers to the teeth in the upper jaw, the gum, periosteum, and the cavities of the jaw. The vasomotor nerves of all these parts are supplied from the upper cervical ganglion of the sympathetic.

The sphenopalatine ganglion (Meckel's — n) forms connections with the second division. To it pass two short sensory root fibers from the second division itself, which are called sphenopalatine. Motor fibers enter the ganglion from behind, through the large superficial petrosal branch of the facial (j); and gray vasomotor fibers (v) from the sympathetic plexus on the carotid (the deep large petrosal nerve). The motor and vasomotor fibers from the Vidian nerve, which reach the ganglion through the canal of the same name.

Branches of Meckel's Ganglion.—(1) The sensory fibers (N) which supply the roof, lateral walls and septum of the nose (posterior and superior nasal); the terminal fibers of the nasopalatine pass through the canalis incisivus to the hard palate, behind the incisor teeth. The sensory inferior and posterior nasals for the lower and middle turbinate bones, and both lower nasal ducts, are derived from the anterior palatine branch of the ganglion, which descends in the palatomaxillary canal. (See illustrations I and III.) Lastly, the sensory branches of the hard (p) and soft palate (pl) and the tonsils arise from the posterior palatine nerve. All the sensory fibers of the nose (see also the ethmoidal nerve), when stimulated, cause the reflex act of sneezing. Preparatory to the act of sneezing there is always a peculiar feeling of tickling in the nose, which is perhaps due to dilatation of the nasal blood vessels. This dilatation is rapidly caused by

cold, more especially when it is applied directly to the skin. The dilatation of the vessels is followed by an increased secretion of watery fluid from the nasal mucous membrane. Stimulation of the nasal nerves also causes a reflex secretion of tears, and it may also cause a standstill of the respiratory movements of the expiratory phase.

(2) The motor branches descend in the posterior palatine nerve through the small palatine canal, and give off (h) motor branches to the elevator of the soft palate and azygos uvulæ. The sensory fibers of these muscles are supplied by the trigeminus. According to Politzer, spasmodic contraction of these muscles occasionally causes crackling noises in the ears.

(3) The vasomotor nerves of this entire area arise from the sympathetic root, i. e., from the upper cervical ganglion. The root of the trigeminus supplies the secretory nerves of the mucous glands of the nasal mucous membrane. Stimulation excites the secretion, while section of the trigeminus decreases it with simultaneous atrophic degeneration of the mucous membrane. Thus, trophic functions for the mucosa have been ascribed to the trigeminus.

The third branch is rarely involved in the conditions we are studying, supplying as it does the lower part of the face and neck. It is closely associated, however, with the other branches through its ganglion and through the tympanic plexus, which accounts for the pains which are often reflected to the ear when the fifth nerve is really the site of the lesion itself. Below is given the anatomy of the cephalic portion of the sympathetic, being taken from Gray's anatomy:

THE SYMPATHETIC NERVE.

The sympathetic nerve is socalled from the opinion entertained that through it is produced a sympathy between the affections of distant organs. It consists of a series of ganglia, connected together by intervening cords, extending on each side of the vertebral column from the base of the skull to the coccyx. It may, moreover, be traced up into the head, where the ganglia (which are all in connection with the fifth cranial nerve) occupy spaces between the cranial and facial bones.

The sympathetic nerve, for convenience of description, may

be divided into several parts, according to the position occupied by each. Of these we will briefly describe:

1. Cephalic portion .....4 pairs of ganglia
2. Cervical portion .....3 pairs of ganglia

Each ganglion may be regarded as a distinct center, from or to which branches pass in various directions. These branches may be thus arranged: 1. Branches of communication between the ganglia. 2. Branches of communication with the cerebral or spinal nerves. 3. Primary branches passing to be distributed to the arteries in the vicinity of the ganglia, and to the viscera, or proceeding to other ganglia placed in the thorax, abdomen or pelvis.

Of these the primary branches of distribution also consist of two kinds of nerve fibers, the sympathetic and the spinal. They have a remarkable tendency to form intricate plexuses, which encircle the blood vessels, and are conducted by them to the viscera.

The cephalic portion of the sympathetic consists of four pairs of ganglia: 1. The ophthalmic ganglion. 2. The sphenopalatine, or Meckel's ganglion. 3. The otic, or Arnold's ganglion. 4. The submaxillary ganglion. These have been already described in connection with the three divisions of the fifth nerve. There is also the single ganglion uniting the two sides, i. e., Ribes' ganglion.

CERVICAL PORTION OF THE SYMPATHETIC.

The cervical portion of the sympathetic consists of three ganglia on each side, which are distinguished, according to their position, as the superior, middle, and inferior cervical. (See illustration No. I.)

The superior cervical ganglion, the largest of the three, and the one which is of interest to us, is placed opposite the second and third cervical vertebræ, and sometimes as low as the fourth or fifth. It is of a reddish gray color, and usually fusiform in shape; sometimes broad and occasionally constricted at intervals, so as to give rise to the opinion that it consists of the coalescence of several smaller ganglia. It is in relation, in front, with the sheath of the internal carotid artery and internal jugular vein; behind, it lies on the rectus capitus anticus major muscle.

Its branches may be divided into superior, inferior, external, internal and anterior.

The superior branch appears to be a direct continuation of the ganglion. It is soft in texture and of a reddish color. It ascends by the side of the internal carotid artery, and entering the carotid canal in the temporal bone, divides into two branches, which lie, one on the outer, and the other on the inner side of that vessel.

The outer branch, the larger of the two, distributes filaments to the internal carotid artery, and forms the carotid plexus.

The inner branch also distributes filaments to the internal carotid, and, continuing onwards, forms the cavernous plexus.

CAROTID PLEXUS.

The carotid plexus is situated on the outer side of the internal carotid. Filaments from this plexus occasionally form a small gangliform swelling on the under surface of the artery, which is called the carotid ganglion. The carotid plexus communicates with the Gasserian ganglion, with the sixth nerve, and sphenopalatine ganglion, and distributes filaments to the wall of the carotid artery, and to the dura mater (Valentin), while in the carotid canal it communicates with Jacobson's nerve, the tympanic branch of the glossopharyngeal.

The communicating branches with the sixth nerve consist of one or two filaments which join that nerve as it lies upon the outer side of the internal carotid. Other filaments are also connected with the Gasserian ganglion. The communication with the sphenopalatine ganglion is effected by the carotid portion of the Vidian nerve, which passes forward, through the cartilaginous substance filling the foramen lacerum medium, along the pterygoid or Vidian canal, to the sphenopalataine ganglion. In this canal it joins the petrosal branch of the facial, thus forming the Vidian.

CAVERNOUS PLEXUS.

The cavernous plexus is situated below and internal to that part of the internal carotid which is placed by the side of the sella turcica in the cavernous sinus, and is formed chiefly

by the internal division of the ascending branch from the superior cervical ganglion. It communicates with the third, fourth, fifth and sixth nerves, and with the ophthalmic ganglion, and distributes filaments to the wall of the internal carotid. The branch of communication with third nerve joins it at its point of division; the branch to the fourth nerve joins it as it lies on the outer wall of the cavernous sinus; other filaments are connected with the under surface of the trunk of the ophthalmic nerve; and a second filament of communication joins the sixth nerve.

The filament of connection with the ophthalmic ganglion arises from the anterior part of the cavernous plexus; it accompanies the nasal nerve, or continues forwards as a separate branch.

The terminal filaments from the carotid and cavernous plexuses are prolonged along the internal carotid, forming plexuses which entwine round the cerebral and ophthalmic arteries; along the former vessel they may be traced on to the pia mater; along the latter, into the orbit, where they accompany each of the subdivisions of the vessel, a separate plexus passing from the arteria centralis retinæ into the interior of the eyeball. The filaments prolonged onto the anterior communicating artery form a small ganglion, the ganglion of Ribes, which serves, as mentioned above, to connect the sympathetic nerves of the right and left sides.

If we now take up the physiology of the sympathetic, it at once becomes interesting in connection with our subject. The functions attributed to the cervical portion are as follows:

1. Pupil dilating fibers. Section of the cervical sympathetic causes contraction, while irritation causes dilatation of the pupil.

2. Motor fibers for Müller's smooth muscle of the orbit.

3. Vasomotor fibers for the outer ear and side of the face, the tympanum, conjunctiva, iris, choroid and the retina in part.

4. Trophic fibers, sweat fibers for the face, and secretory fibers for the various glands, such as the lacrimal, the several salivary and the mucous glands.

With this sketch before us, the writer desires to read some extracts from a reprint recently sent to him by Dr. Gruening, after having discussed the question with him. In it he says

that "at times the statement is made that an optic neuritis has developed into a choked disc, thus implying that choked disc is a more advanced stage of optic neuritis." This, he says, is an erroneous view. He describes choked disc as having an initial, an intermediate and an advanced stage, every one of which is the ophthalmoscopically visible expression of increased intracranial pressure. He then tells us why it is that when an optic neuritis is present there is never any choked disc, because the intervaginal spaces are sealed by exudative material so that the serum does not enter the lymph spaces of the optic nerve and the perilymphatic sheaths of the optic and retinal vessels. He then asks this pertinent question: "How can the choking of the disc, which is so far from the area of the disease, in purulent middle ear disease, be explained?" He acknowledges in answer to this question that there is no succinct and lucid explanation of this interrelation. He then asks: "But what causes the excess of the cerebrospinal fluid?" and in answer says that the theory of chemotaxis, as defined by Theodor Leber, may furnish the clue. That theory is a most difficult one to understand, and, to the writer, cannot explain why one orbit is so often affected and not both. Dr. Gruening also writes that another point of interest is that the degree of swelling may vary in the two discs. As we assume that the hydrostatic pressure is equal at all points within the brain cavity, there must be structural conditions causing these variations. In conclusion he says "that further confirmation that we have not to deal with inflammatory action and destruction of the nerve tissue in choked discs in otitis cases is supplied by the fact that on removal of the purulent area the optic nerve returns to the normal." When such an authority as Dr. Gruening offers such a paper before the International Otological Congress, it seems to be pretty conclusive evidence that as yet but little is known of the true conditions which are manifested in the eyes, and affords the writer some excuse for the length of the present paper. He asks that you bear well in mind, first, that the sympathetic nerve is the vasomotor nerve of the eye, that is, it controls the blood supply. Second, that these nerves, after leaving the superior cervical ganglion, form the carotid plexus, and then on entering the cavernous sinus form the cavernous plexus and lie on its inner wall in

contact with the sphenoids. Third, that the branches, after leaving these plexuses, often run through small bony canals in the walls of cavities or sinuses that become inflamed, such as the Vidian, the greater and lesser petrosal nerves and the branches entering the tympanum. Remembering the above relations, and considering that almost all of the ocular disturbances are true disturbances of the vasomotor system, it seems to the writer that the rational explanation of these symptoms lies in correctly attributing them to the sympathetic nerve. The delicate fibers of this system are much more exposed to irritation from inflammations in the accessory sinuses and even in the ear than any of the other nerves, and reference to the physiology will show that any or all of these ocular symptoms have actually been produced by experiments on these nerves. Dr. J. D. Richards describes two cases of pupil dilatation following extensive exenteration of the petrous bone with exposure of the carotid artery in its canal, and attributed the dilatation to irritation of the plexus. In both cases, although the dilatation was very marked, still there was reaction to light and to accommodation, showing that the disturbance came through the fifth nerve. Although all writers maintain that choked disc is always caused by increased intracranial pressure, in most of our cases there are absolutely no other symptoms of this condition present, and it is certainly remarkable that in most cases the eye conditions clear up as soon as the local nasal or aural disease is cured or the irritation removed. Again, it is a very significant fact that in many cases where operation has cured the nasal disease and the eye symptoms have been relieved, an acute exacerbation will often be accompanied by a return of the eye symptoms, which will again disappear with the cure of the attack. True paralyses of the orbital muscles are not common and are more difficult to explain. However, the intimate relation of the sixth nerve, as it pierces the dura, with the two petrosal sinuses and then with the interior of the cavernous sinus itself, accounts for its implication whenever these sinuses are thrombosed.

Dr. Sluder has written often concerning the sphenopalatine ganglion and his method of treating it. He has undoubtedly been very successful, but an examination of the specimens presented will show how difficult it is to reach this region,

and only an unusually skillful man with an absolute appreciation of the anotomy had better attempt these injections. It has required much time and great care for the writer to open the specimens in order to actually show the ganglion in its place where it is enmeshed in many blood vessels.

Let us look at the disease called glaucoma. This disease consists of a great increase in the intraocular tension (due to vasomotor disturbances), and frequently destroys the eye if not promptly relieved. Dr. Sluder reports ten cases of glaucoma in which he has relieved the pain by cocainization of the sphenopalatine foramen. Lapersonne and Fisch have reported cases of increased intraocular pressure caused b accessory sinus disease. Now turn back to the section on physiology and, under the ophthalmic branch of the fifth nerve, you will find that Donders has ascribed the greatly increased intraocular tension to irritation of the trigeminus. Read also in the same paragraph what Eulenberg says about ophthalmia intermittens, which he describes as an angioneurotic affection of the ocular blood vessels. This paragraph, in conclusion, says that "there are other diseases of the eye depending upon disease of the vasomotor nerves which are peculiar in that they do not lead to degenerative changes." Amaurosis, i. e., weakness of vision, and amblyopia frequently result from optic neuritis, but Landois says that both may be the signs of disturbances in other organs; that they may be sympathetic signs due to changes in the movement of the blood stream, depending upon stimulation of the vasomotor nerves. In fact, a careful study of the physiologic experiments upon the orbital nerves, and especially the sympathetic branches, will disclose the fact that all of the ocular manifestations that we see and have been so frequently described have been caused by section of or by irritation of the sympathetic nerve supply. There is one more point the writer in closing wishes to suggest, and that is the probable influence of the trophic nerve fibers. These are also sympathetic fibers conveying impulses from the centers to the periphery. Their end organs lie in the tissues themselves, although little is known about them. They are called trophic because they are supposed to govern or control the normal metabolism of the tissues. There are many diseases attributed to disease of these fibers or the centers from which they

spring, such as the various forms of herpes, the condition known as "glossy skin," progressive muscular atrophy, myxoderma (seen in the nose as polypi), leucoderma, Addison's disease, anesthetic leprosy, and acute decubitus or bed sores. All nerves are supplied with trophic fibers, and it naturally follows that if these nerves become diseased and are destroyed, the nerve supplied by them will also atrophy and lose its function. To the writer this supplies a reasonable theory to explain why in cases of long standing disease of the sinuses, the disturbances of vision do not recover after the sinus disease has been cured, although in recent cases vision almost invariably does return. Irritation of any tissue for a short period of time will not produce any actual tissue change, but long continued irritation will gradually produce actual destruction, and that is what probably does take place in these eye cases. At first the sympathetic nerves are merely irritated by the inflammatory sinus and produce the symptoms of increased vasomotor action, but after long irritation the trophic nerves become destroyed and thus destroy the trophic control of the optic, and it loses its function, although an actual neuritis has never been present. When we consider that the majority of nasal affections are affections of the vasomotor nerves, and then realize that these same vasomotor branches are so intimately associated with the sphenoid sinuses, even before they join their individual ganglia, it does not seem to be unreasonable to advance the theories advanced in this paper, and the writer hopes that it will help all in the true interpretation of cases to be seen.

The writer desires to thank J. B. Lippincott & Co. and P. Blakiston's Son & Co. for their very kind permission to use the illustrations in this article, which are so much better than he could have prepared himself.

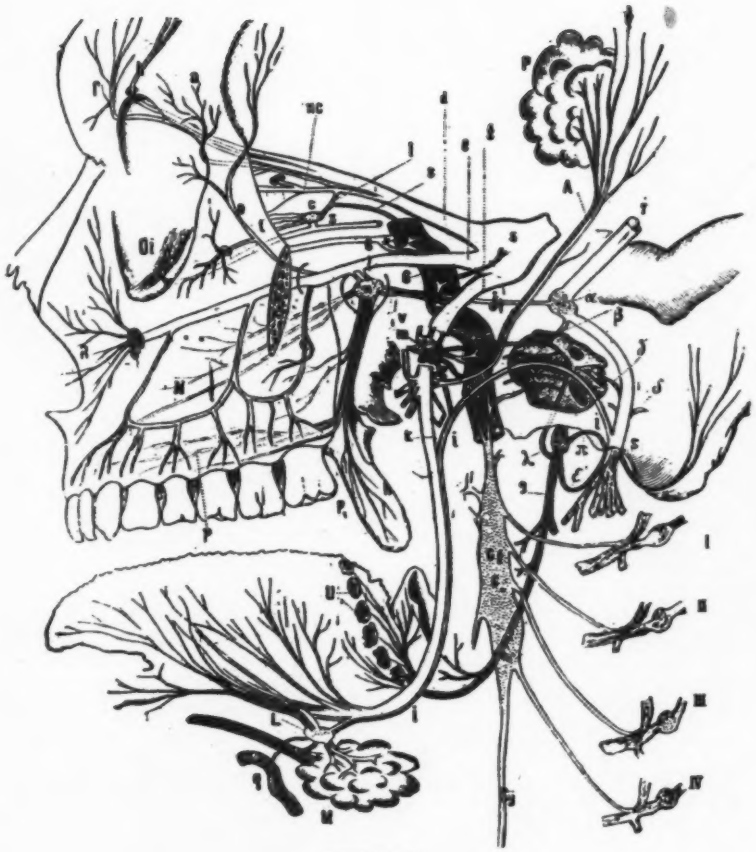

FIGURE I.

N. pterygoideus externus

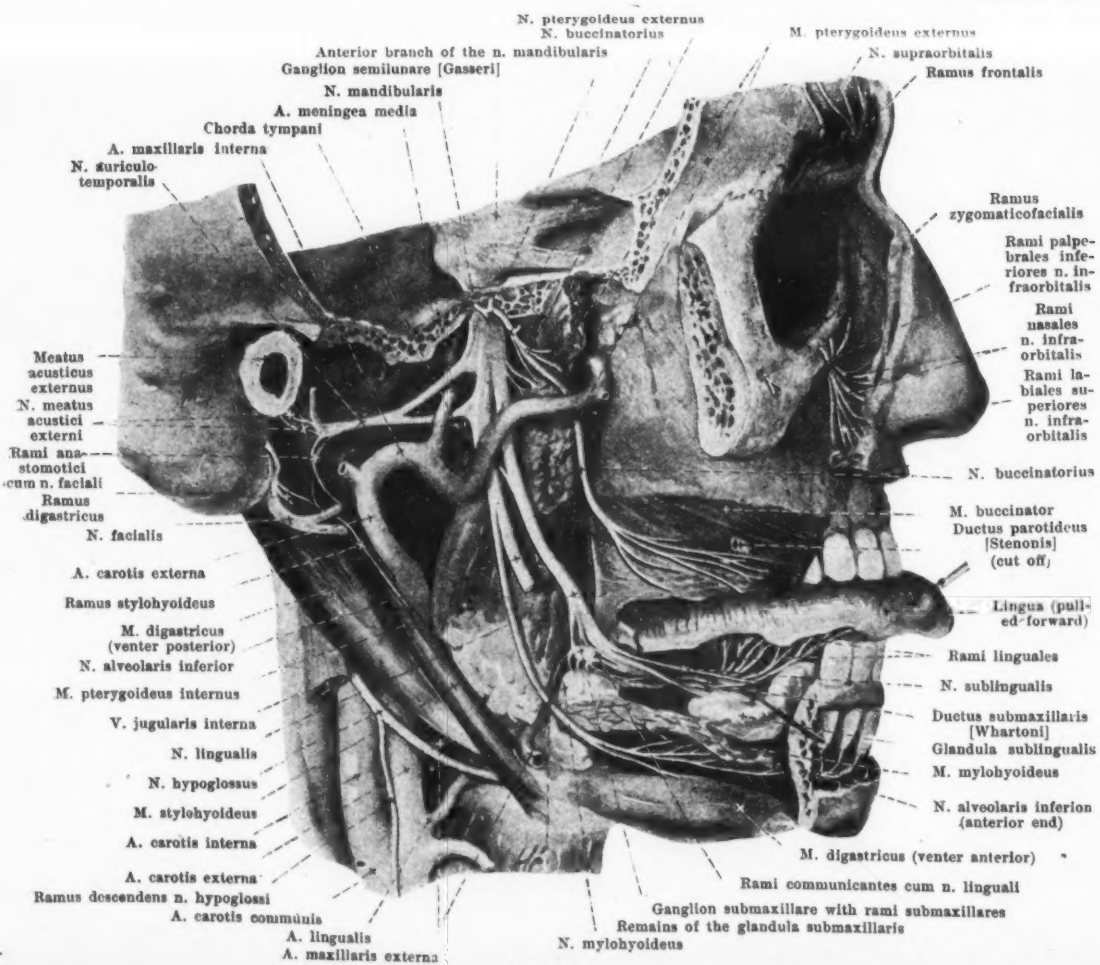
N. pterygoideus externus
N. buccinatorius
M. pterygoideus externus
N. supraorbitalis
Ramus frontalis
Anterior branch of the n. mandibularis
Ganglion semilunare [Gasseri]
N. mandibularis
A. meningea media
Chorda tympani
A. maxillaris interna
N. auriculo-temporalis
Ramus zygomaticofacialis
Rami palpebrales inferiores n. infraorbitalis
Rami nasales n. infraorbitalis
Rami labiales superiores n. infraorbitalis
Meatus acusticus externus
N. meatus acustici externi
Rami anastomotici cum n. faciali
Ramus digastricus
N. facialis
N. buccinatorius
M. buccinator
Ductus parotideus [Stenonis] (cut off)
A. carotis externa
Ramus stylohyoideus
Lingua (pulled forward)
M. digastricus (venter posterior)
N. alveolaris inferior
Rami linguales
N. sublingualis
M. pterygoideus internus
V. jugularis interna
Ductus submaxillaris [Whartoni]
Glandula sublingualis
N. lingualis
M. mylohyoideus
N. hypoglossus
M. stylohyoideus
N. alveolaris inferior (anterior end)
A. carotis interna
M. digastricus (venter anterior)
A. carotis externa
Rami communicantes cum n. linguali
Ramus descendens n. hypoglossi
Ganglion submaxillare with rami submaxillares
A. carotis communis
Remains of the glandula submaxillaris
A. lingualis
N. mylohyoideus
A. maxillaris externa

FIGURE II.

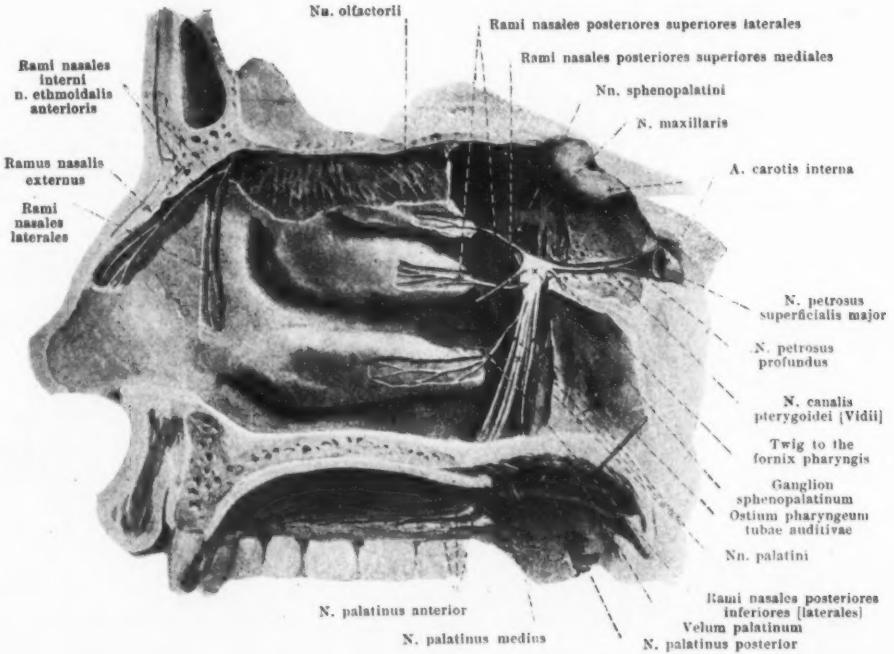
Nn. olfactorii
Rami nasales posteriores superiores laterales
Rami nasales posteriores superiores mediales
Nn. sphenopalatini
N. maxillaris
A. carotis interna
Rami nasales interni n. ethmoidalis anterioris
Ramus nasalis externus
Rami nasales laterales
N. petrosus superficialis major
N. petrosus profundus
N. canalis pterygoidei [Vidii]
Twig to the fornix pharyngis
Ganglion sphenopalatinum
Ostium pharyngeum tubae auditivae
Nn. palatini
Rami nasales posteriores inferiores [laterales]
Velum palatinum
N. palatinus posterior
N. palatinus anterior
N. palatinus medius

FIGURE III.

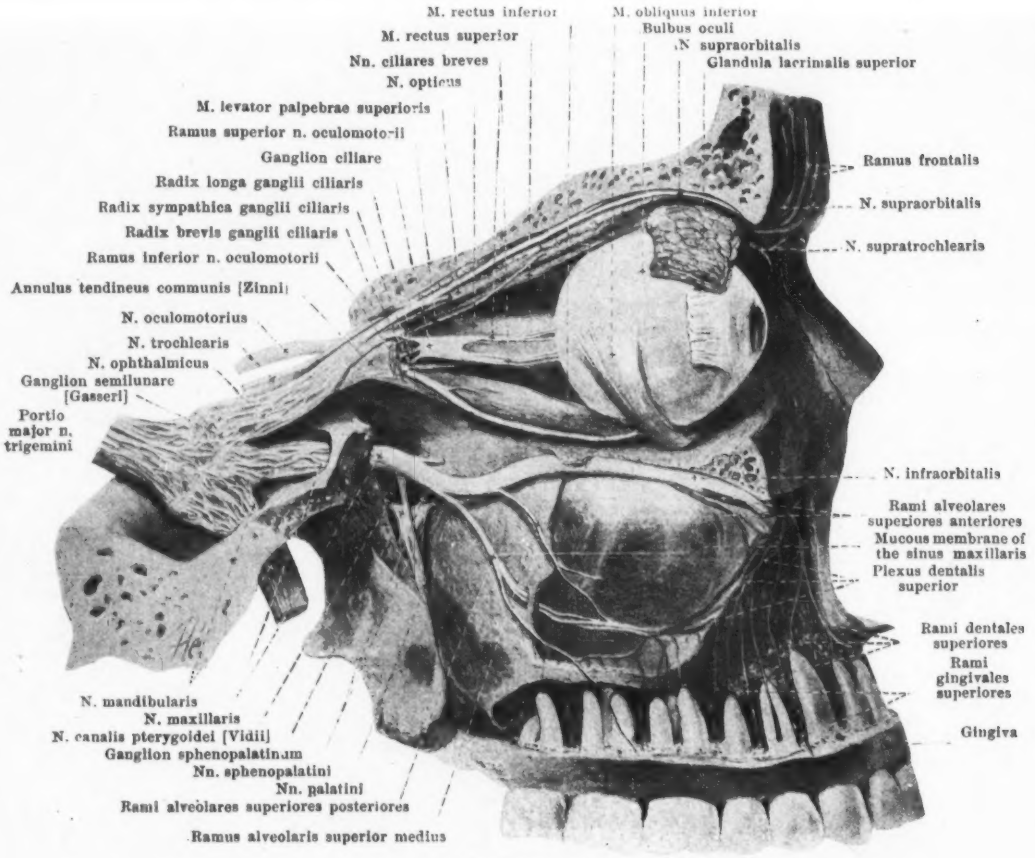
M. rectus inferior
M. obliquus inferior
Bulbus oculi
M. rectus superior
N. supraorbitalis
Nn. ciliares breves
Glandula lacrimalis superior
N. opticus
M. levator palpebrae superioris
Ramus superior n. oculomotorii
Ganglion ciliare
Ramus frontalis
Radix longa ganglii ciliaris
N. supraorbitalis
Radix sympathica ganglii ciliaris
Radix brevis ganglii ciliaris
N. supratrochlearis
Ramus inferior n. oculomotorii
Annulus tendineus communis [Zinni]
N. oculomotorius
N. infraorbitalis
N. trochlearis
N. ophthalmicus
Rami alveolares superiores anteriores
Ganglion semilunare [Gasseri]
Mucous membrane of the sinus maxillaris
Portio major n. trigemini
Plexus dentalis superior
Rami dentales superiores
Rami gingivales superiores
N. mandibularis
N. maxillaris
Gingiva
N. canalis pterygoidei [Vidii]
Ganglion sphenopalatinum
Nn. sphenopalatini
Nn. palatini
Rami alveolares superiores posteriores
Ramus alveolaris superior medius

FIGURE IV.

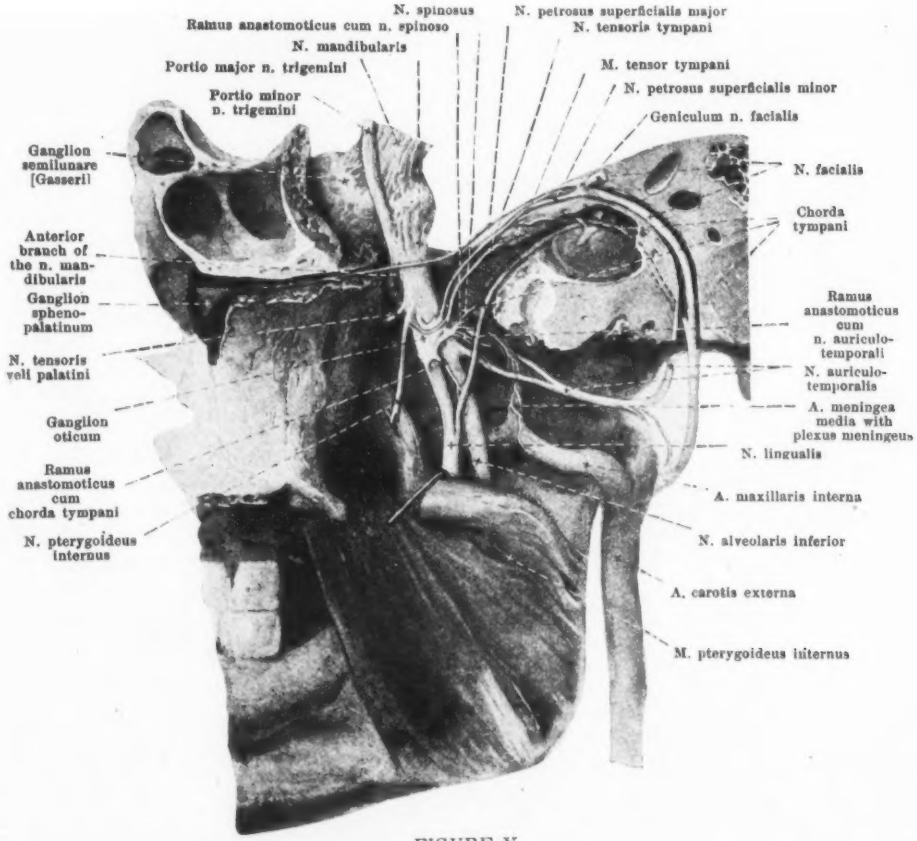
N. spinosus
N. petrosus superficialis major
Ramus anastomoticus cum n. spinoso
N. tensoris tympani
N. mandibularis
M. tensor tympani
Portio major n. trigemini
N. petrosus superficialis minor
Portio minor n. trigemini
Geniculum n. facialis
Ganglion semilunare [Gasseri]
N. facialis
Chorda tympani
Anterior branch of the n. mandibularis
Ganglion sphenopalatinum
Ramus anastomoticus cum n. auriculotemporali
N. tensoris veli palatini
N. auriculotemporalis
A. meningea media with plexus meningeus
Ganglion oticum
N. lingualis
Ramus anastomoticus cum chorda tympani
A. maxillaris interna
N. pterygoideus internus
N. alveolaris inferior
A. carotis externa
M. pterygoideus internus

FIGURE V.

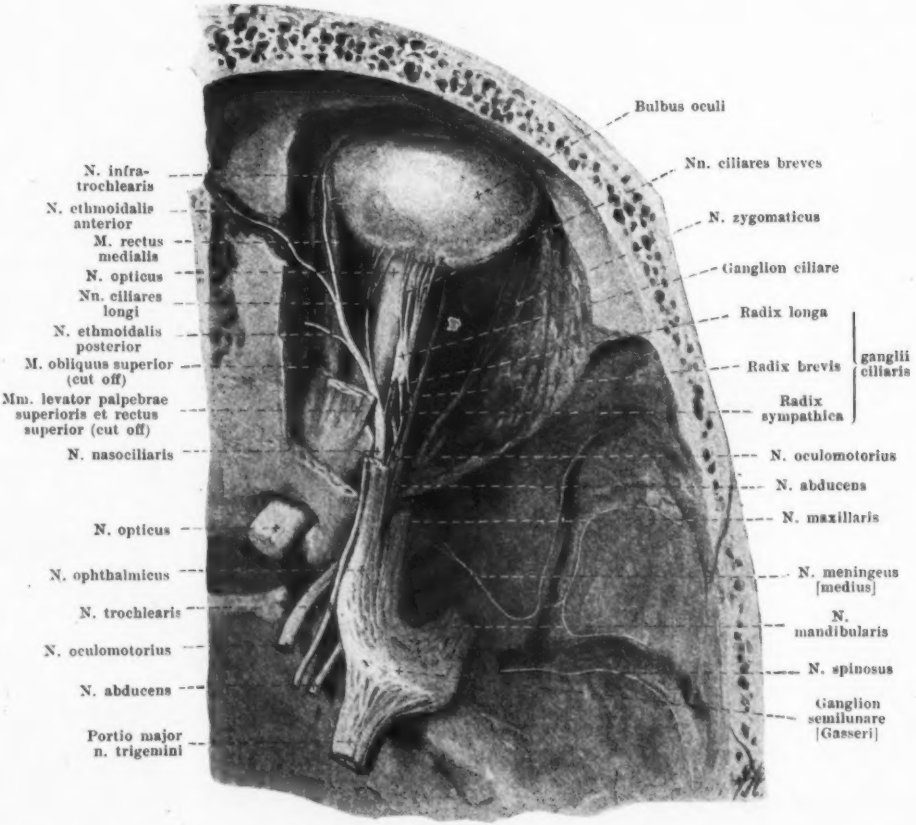
Bulbus oculi
Nn. ciliares breves
N. zygomaticus
Ganglion ciliare
Radix longa
Radix brevis
Radix sympathica
ganglii ciliaris
N. oculomotorius
N. abducens
N. maxillaris
N. meningeus [medius]
N. mandibularis
N. spinosus
Ganglion semilunare [Gasseri]
N. infra-trochlearis
N. ethmoidalis anterior
M. rectus medialis
N. opticus
Nn. ciliares longi
N. ethmoidalis posterior
M. obliquus superior (cut off)
Mm. levator palpebrae superioris et rectus superior (cut off)
N. nasociliaris
N. opticus
N. ophthalmicus
N. trochlearis
N. oculomotorius
N. abducens
Portio major n. trigemini

FIGURE VI.

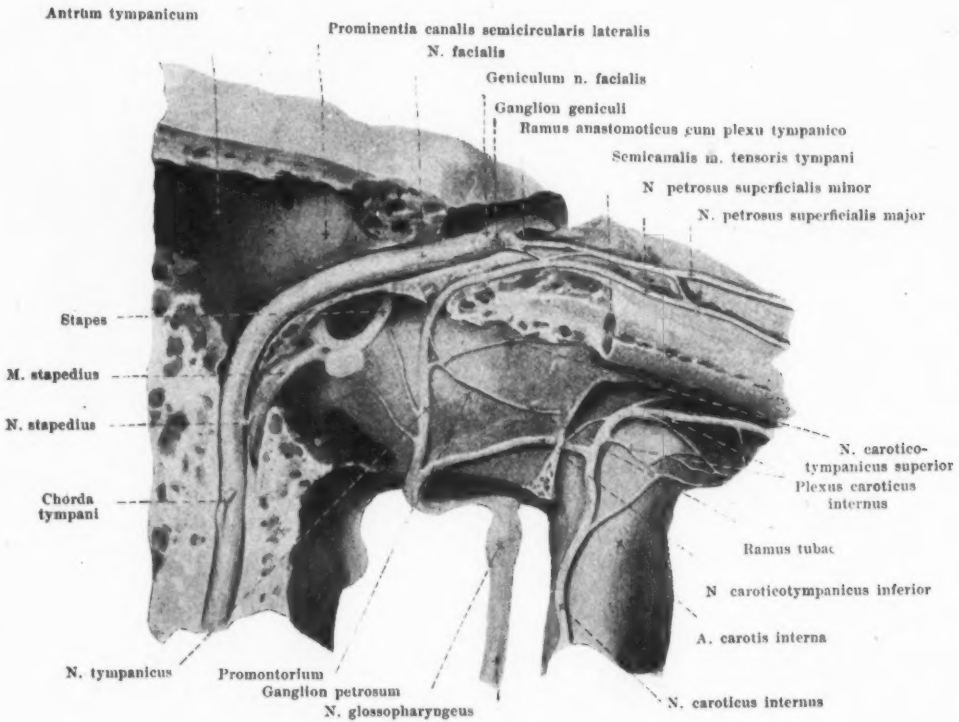
Antrum tympanicum
Prominentia canalis semicircularis lateralis
N. facialis
Geniculum n. facialis
Ganglion geniculi
Ramus anastomoticus cum plexu tympanico
Semicanalis m. tensoris tympani
N petrosus superficialis minor
N. petrosus superficialis major
Stapes
M. stapedius
N. stapedius
Chorda tympani
N. caroticotympanicus superior
Plexus caroticus internus
Ramus tubae
N caroticotympanicus inferior
A. carotis interna
N. tympanicus
Promontorium
Ganglion petrosum
N. glossopharyngeus
N. caroticus internus

FIGURE VII.

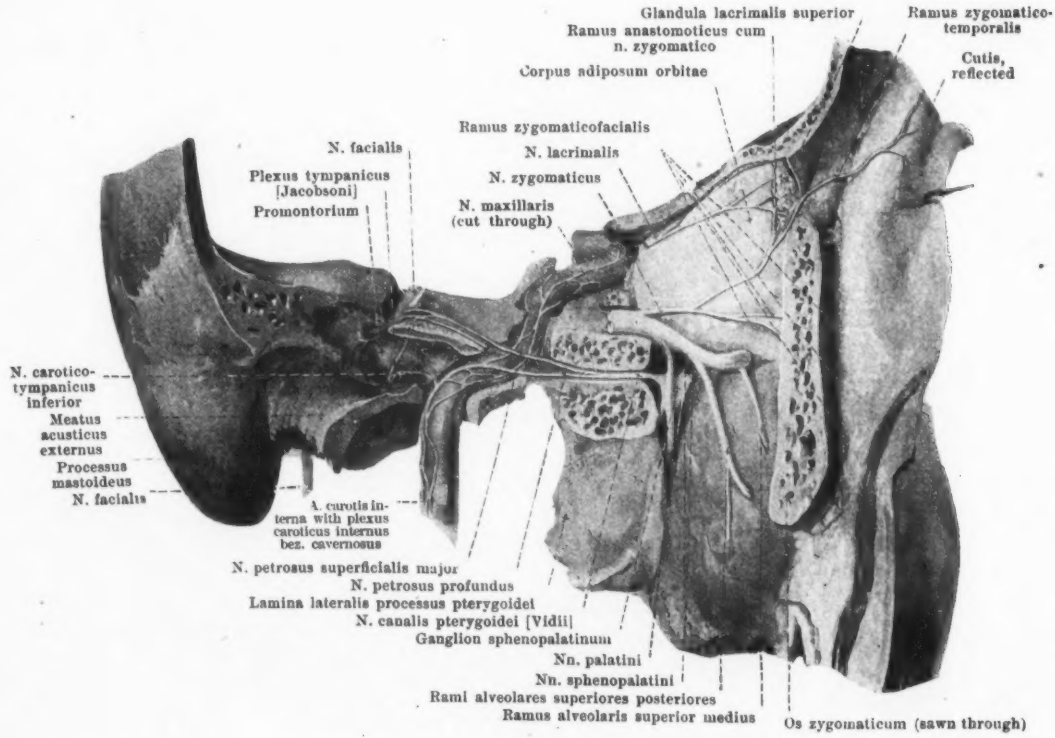
Glandula lacrimalis superior
Ramus anastomoticus cum n. zygomatico
Ramus zygomatico-temporalis
Corpus adiposum orbitae
Cutis, reflected
Ramus zygomaticofacialis
N. facialis
N. lacrimalis
Plexus tympanicus [Jacobsoni]
N. zygomaticus
Promontorium
N. maxillaris (cut through)
N. carotico-tympanicus inferior
Meatus acusticus externus
Processus mastoideus
N. facialis
A. carotis interna with plexus caroticus internus bez. cavernosus
N. petrosus superficialis major
N. petrosus profundus
Lamina lateralis processus pterygoidei
N. canalis pterygoidei [Vidii]
Ganglion sphenopalatinum
Nn. palatini
Nn. sphenopalatini
Rami alveolares superiores posteriores
Ramus alveolaris superior medius
Os zygomaticum (sawn through)

FIGURE VIII.

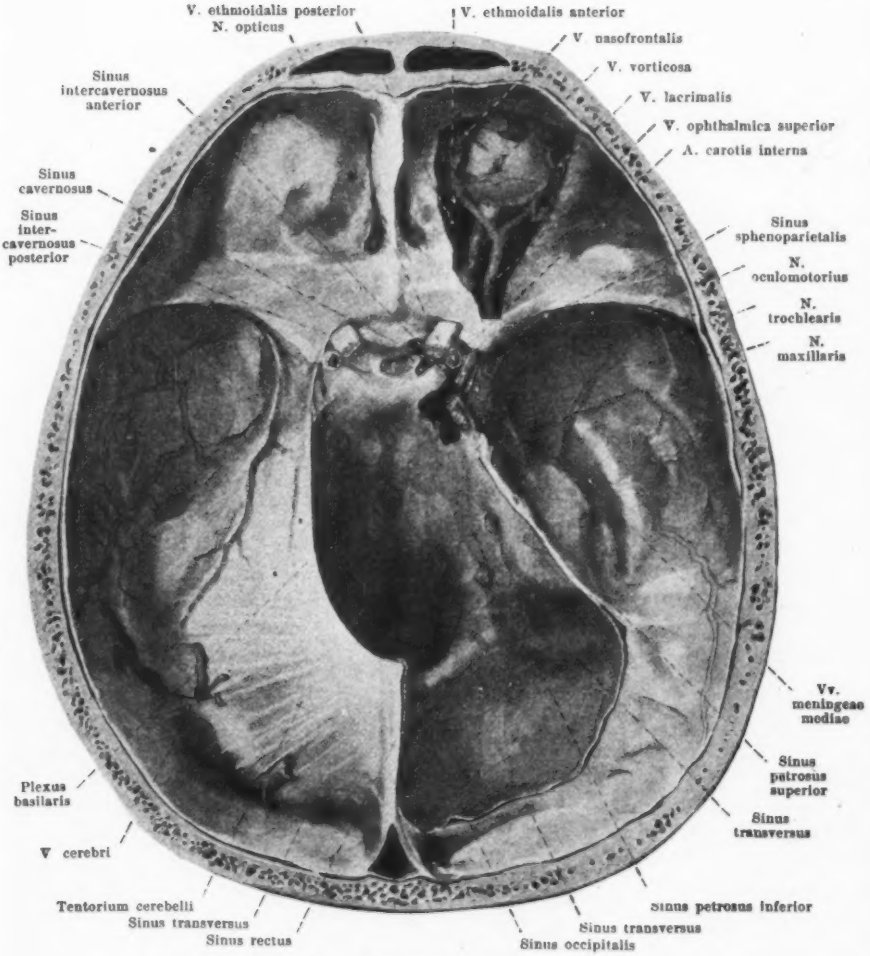
V. ethmoidalis posterior
N. opticus
V. ethmoidalis anterior
V nasofrontalis
V. vorticosa
V. lacrimalis
V. ophthalmica superior
A. carotis interna
Sinus intercavernosus anterior
Sinus cavernosus
Sinus intercavernosus posterior
Sinus sphenoparietalis
N. oculomotorius
N. trochlearis
N. maxillaris
Vv. meningeae mediae
Sinus petrosus superior
Sinus transversus
Plexus basilaris
V cerebri
Tentorium cerebelli
Sinus transversus
Sinus rectus
Sinus petrosus inferior
Sinus transversus
Sinus occipitalis

FIGURE IX.

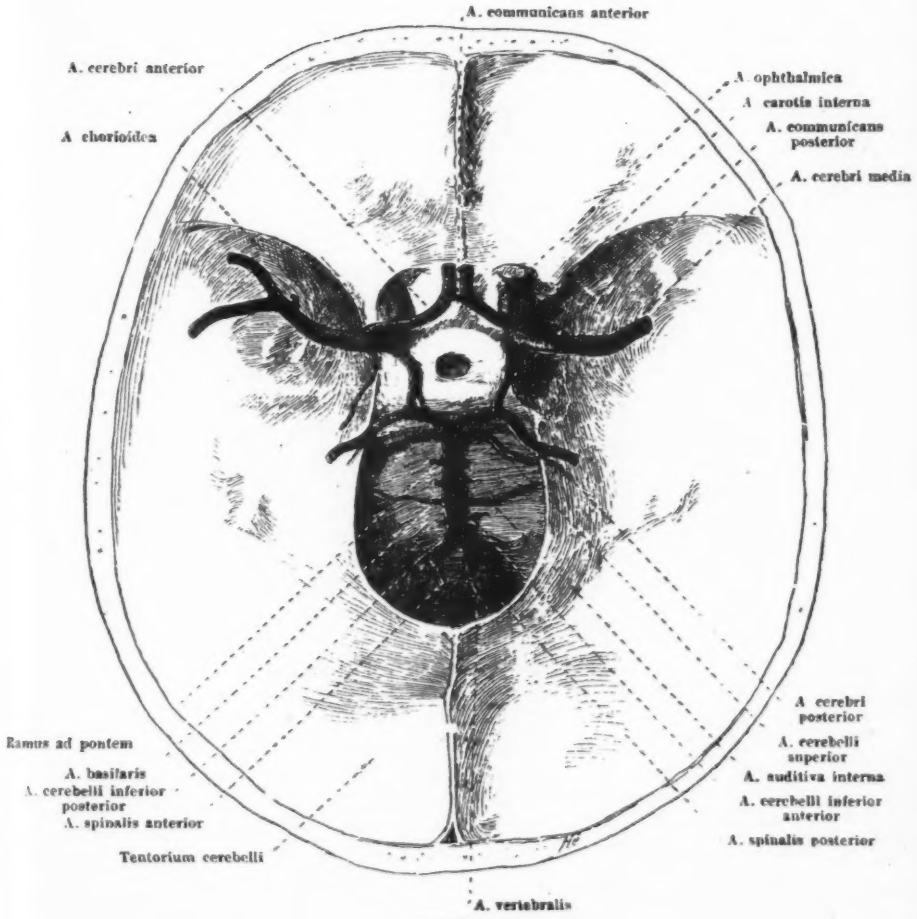
A. communicans anterior
A. cerebri anterior
A. chorioidea
A. ophthalmica
A. carotis interna
A. communicans posterior
A. cerebri media
A. cerebri posterior
A. cerebelli superior
A. auditiva interna
A. cerebelli inferior anterior
A. spinalis posterior
Ramus ad pontem
A. basilaris
A. cerebelli inferior posterior
A. spinalis anterior
Tentorium cerebelli
A. vertebralis

FIGURE X.

XXI.

RESULTS IN A SERIES OF CASES OF TONSILLECTOMY AT THE MASSACHUSETTS GENERAL HOSPITAL, THREE TO FOUR YEARS AFTER OPERATION.*

By J. Payson Clark, M. D.,

Boston.

The year beginning July 1, 1908, was chosen for study because sufficient time has elapsed since then to make the reports valuable as end results. The reasons for not selecting an earlier year were, in the first place, that this was about the time when we began to do tonsillectomy at the hospital as a practically routine procedure in all cases where a removal of the tonsils appeared to be indicated; and in the second place, because the longer the time since the operation the smaller the number who were likely to respond to a request to report. The reasons for this latter statement are obvious and need not be mentioned. Postal cards stating, in substance, that Dr. Clark was interested to know their present condition and would like to have them report on one of certain given dates at the throat clinic of the hospital, were sent to all the cases. Those selected were under the heading "adenoids and tonsils" in our card index. Of course many of these cases had only an adenoid operation, and such cases were not asked to report. As a result of selecting only the cases of tonsil operation which were listed under this heading, it is obvious that adults were practically excluded from the list. It was felt that as the tonsil is physiologically more active in children, a study of end results would be more valuable in them, and that the results of tonsillectomy in adults could be more profitably considered in a separate paper.

I began sending out these notices in July, 1912, sending out a few each week, so that I should not be overwhelmed by too

*Read at the meeting of the American Laryngological Association in Washington, May, 1913.

large a number reporting at any one time. I wanted to see all the cases myself, but this was not possible, as I was unable to go to the hospital at several different times. The cases which I did not see personally (fifty-three in all) were examined by one of my colleagues and recorded for me.

Nine hundred and ninety-two postals were mailed, and to these one hundred and forty-three patients responded by reporting in person at the clinic. This is only 14.4 per cent of the number asked to report. This percentage is a little better than a few years ago, when I wrote on "Results in Adenoid and Tonsil Operations" (*Boston Medical and Surgical Journal*, September 24, 1908). At that time I sent out five hundred and ninety-five cards, and (to quote from that paper) "the responses were exceedingly disappointing as to number, amounting in all to seventy-three, or a little over 12 per cent of the cases to whom notices were sent. Between three and four years having elapsed since the operation, many of the patients have doubtless moved, so that the cards did not reach them, and others live at too great a distance to be able to come in easily." In talking to other investigators of all kinds of medical and surgical cases, I find that my experience in this particular is a common one. I believe, however, that it is fair to take the cases which did report as a pretty good criterion of the results in all the cases. I received a dozen or more letters in response to the card, stating that the patient could not come to the hospital for one reason or another. These cases are, of course, not included in my statistics. Those who reported were subjected to the following examination:

1. Patient's name, sex, age (at present time), number?
2. Date of operation?
3. Any hemorrhage after operation requiring treatment? If so, what treatment?
4. Was adenoid removed at same time or not?
5. For what reason were the tonsils removed? (On account of size, frequent tonsillitis, enlarged cervical glands, rheumatism or other evidence of septic absorption or any other reason?)
6. Was the trouble for which the tonsils were removed relieved?

7. Was there a marked improvement in general condition after operation?
8. Has the patient had any illness since operation? If so, what and when? Has patient had any sore throats?
9. Present state of health?
10. Appearance of throat? (State whether any tonsillar tissue appears to remain, also as to symmetry of soft palate and pillars, presence or absence of tonsillar fossæ, etc.)
11. Any difference in voice or speech since operation?
12. Are there any enlarged cervical glands now?

A review and analysis of the answers to the questions and the findings at the examination follow:

The ages of the patients ranged from five to thirty-six years, distributed thus: 5 to 10 years, 45; 10 to 15 years, 76; 15 to 20 years, 17; over 20 years, 4. As these are the ages at the present time, it is obvious that the ages averaged four years less at the time of the operation. Of the patients over 20 years of age, one is now 23, one 26, one 27 and one 36 years old. There were seventy-six males and sixty-seven females. All who reported had adenoids removed at the same time. It is hardly necessary to say that the adenoids were of varying relative importance in the different cases, sometimes being so small as to seem to be hardly worth considering, and in other cases being the chief reason for operation.

Only one case had bleeding after the operation which was worthy of note. In this case the bleeding was so free that the patient was kept in the hospital over night, but no operative treatment was required to stop the bleeding. I might say here that up to last fall it was our custom at the Massachusetts Hospital to allow children on whom tonsillectomy had been done to go home in the afternoon (the operation having been done in the morning). It was felt that if there was no evidence of bleeding by that time, it was fairly safe to asume that there would not be any. On account of the small number of beds at our disposal, we were forced to take this risk or else turn away the majority of our tonsil cases in children. An exception, however, was made in the event of

children living at such a distance from the hospital that they could not be easily reached in case of secondary hemorrhage. These statistics tend to show that the risk which we took was a small one. Since last fall we have had more beds put at our disposal, and now keep all our tonsillectomy cases in the ward for one night. This routine is certainly more conducive to one's peace of mind and much fairer to the children. For, although I feel that where tonsillectomy is competently and carefully done, hemorrhage coming on after the patient has left the operating room and requiring treatment is really a rare occurrence, yet when it does occur it is often so alarming and prompt attention is so important that to keep such patients under observation for twenty-four hours is not being overcautions.

The following table shows for what reason the tonsils were removed and whether the conditions were relieved or not:

Unknown	15
Sore throat relieved	10
Sore throat not relieved	4
Sore throat cured	29
Size	96
Adenitis cured	15
Adenitis not cured	17
Tonsillitis cured	32
Tonsillitis not cured	1
Chorea improved	1
Rheumatism cured	2
Speech cured	1
Circumtonsillar abscess cured	3

Of the fifteen cases in which the reason for removal is not known, several were no doubt operated on because they were under an anesthetic for an adenoid operation, and it was thought just as well to take the tonsils out, without considering whether there were good reasons for their removal or not. We endeavor to guard against unnecessary removal of the tonsils by requiring that the man who operates shall see that the reasons for removing the tonsils are distinctly stated on the history.

There was a marked improvement in the general condition after the operation in eighty-nine cases, a moderate improve-

ment in twenty-nine cases and no improvement in twenty-four cases. Since the operation one patient has had nasal diphtheria, four measles, two whooping cough, one neuritis, one "congestion of the lungs," one chorea, one bronchitis, one pleurisy, five abscess of the ears (two of these requiring a mastoid operation), three pneumonia, and twenty-two sore throat. The present state of health is good or excellent in one hundred and eighteen cases and fair in twenty-two cases. There has been no change in the voice or speech in one hundred and sixteen cases. In twenty-two cases the voice or speech has been improved. In two the voice or speech is said to be not so good. Enlarged cervical glands were absent in ninety-eight cases and present in forty-three. In two cases there is no record on this point.

Tonsil tissue was absent in eighty-two cases. Some tonsil tissue was still present on both sides in thirty-one cases, and on one side only in twenty-eight. Examination was unsatisfactory in the case of an unruly child. Certain cases where it was doubtful whether or not the appearance in the tonsillar fossæ was due to tonsillar tissue, were listed as showing it. In some of these cases it is fair to assume that the lymphoid tissue which was apparently present in the fossa was due to the hypertrophy of some focus of lymphoid tissue which lay outside the tonsil capsule.

The soft palate was symmetrical in one hundred and twenty cases and asymmetrical in eighteen. In five cases no note was made on this point. The soft palate was considered asymmetrical when the uvula was at all to one side of the median line, or when one arch of the velum was flatter than the other. The pillars of the fauces were normal in ninety-six cases and not normal in forty-one. There was no note on this point in six cases. The pillars were recorded as not normal when one or more of them were absent, or when the anterior and posterior pillars on the same side were fused, or when scar tissue showed that one or more of them had been injured at the operation. The tonsil fossæ were present on both sides in ninety-five cases, shallow in sixteen, and one or both were absent in twenty-six cases. There was no record of their condition in five cases. Carious teeth were noted as present in twenty-one cases. Three cases which had enuresis before the operation were not relieved of this trouble. In four cases the uvula was partly or wholly cut off.

Now, let us analyze some of these results and see if we can obtain any interesting or valuable facts from them. In the fifteen cases in which the reason for removing the tonsils does not appear, they may have been removed because they were visible and the operator was of the opinion that as the patient was under ether for an adenoid operation the tonsils were better out, too. Or it may have been that there was some excellent reason for their removal which the operator failed to record. I have already stated how we try to guard against any unnecessary removal of the tonsils.

"Sore throat" was given as a reason for removal of the tonsils in cases in which it was not clear as to whether there had been definite tonsillitis, yet on inspection it appeared probable the tonsils were the seat of the trouble. These numbered forty-three in all. Twenty-nine of these cases have had no sore throat since the operation, ten have had it less frequently or less severely, and four say they have been no better. Of the ten cases which were relieved, one, a woman of 27 years of age, had suffered from frequent tonsillitis before, but since the operation says she has slight sore throat at times. An examination of this case showed in the fossæ a very small amount of tissue with a suggestion of lymphoid characteristics. The patient had not reported at the time of these attacks of sore throat, and it seems fair to assume that they might have been simple pharyngitis. Of the remainder, five showed the presence of more or less tonsil tissue in one or both fossæ. But in all these cases the sore throat was so slight and so infrequent as not to require medical attendance or keep the patients from their regular employment. Four, who have occasional slight sore throat, showed no tonsil tissue. The sore throat in these cases was probably a pharyngitis. Of the four cases in which the sore throat was said to be no better, two showed absolutely no remains of either tonsil, and one of these had a marked chronic pharyngitis. One of the other two showed a small remnant of tonsil on the right, but it seemed very doubtful if this could be the origin of the sore throats which the patient said he had, but for which he had never applied for treatment. In the remaining case there was some doubtful lymphoid tissue in the right fossa.

Of the thirty-two cases in which cervical adenitis was mentioned among the reasons for tonsillectomy, fifteen were

cured, i. e., they show no enlarged cervical glands now. A further consideration of the seventeen cases of adenitis which are put down as not cured, discloses some interesting facts, But it will perhaps be more satisfactory to consider these cases later in connection with those in which the presence or absence of cervical glands was not mentioned at the time of the operation, but in which cervical glands were felt at this examination.

Of the thirty-three cases in which frequent tonsillitis was given as a reason for tonsillectomy, only one was not cured, and in this case it was found that the tonsils had been only partially removed. A case which came on account of deafness was cured, but the simultaneous removal of the adenoids was no doubt a large factor in this result. One case of chorea is much better, but not completely cured. Two cases of rheumatism are cured. It is only fair to say that in neither of these cases was the history of rheumatism very clear. Three cases of circumtonsillar abscess have been cured, one being now 36 years old, one 26, and one 17. Only one patient under 21 years old had circumtonsillar abscess. In eighty-nine cases there was marked improvement in the general condition after the operation. As the adenoids were removed at the same time, a part of the improvement must be attributed to this cause in many of these cases. In twenty-nine other cases there was some improvement, but not marked. In twenty-four cases there was no improvement in the general condition. In fourteen of these cases the health was good before the operation, and the reason for operation was a purely local one. One case of quinsy is cured of that affection and has no tonsil tissue remaining. She now complains of pain going to different parts of the body, on which no diagnosis has been made. One case has no tonsils, but a marked nasal obstruction due to a deviated septum, which may account for lack of general improvement. One case shows no tonsils, but very bad teeth, which are undoubtedly the cause of poor general condition. One patient, whose tonsils have been completely removed, is pale and nervous from some other cause, probably improper diet and carious teeth. One case of retarded mental development was not improved by the operation. One patient, described as "nervous and fidgety" by her mother before the operation, shows no im-

provement in this respect. Her tonsils have been completely removed. The neurologist describes the condition as an "involuntary twitching of the shoulders, characteristically repeated: diagnosis, habit spasm." Four of these cases still show presence of some tonsil tissue on one or both sides. In one of the four it seems more than probable that the present anemic condition and loss of appetite is due to bad teeth and chronic rhinitis, rather than to the small amount of the lower lobe of each tonsil which appears to be present. In the other three cases it is fair to assume, in the absence of other obvious cause, that the lack of general improvement is due to the incomplete operation.

Among the cases which reported there have been the following illnesses: nasal diphtheria, one; measles, four; whooping cough, two; pneumonia, three; "congestion of the lungs," one; pleurisy, one; bronchitis, one; neuritis (?), one; chorea, one; abscess of the ear, five cases (two of which had a mastoid operation). Several had more than one illness, so that the actual number of individuals in the above list is only sixteen. It strikes me as a remarkably good record that of one hundred and forty-three children only sixteen have had a definite illness in four years. The present state of health is stated as good or excellent in one hundred and eighteen cases, fair or poor in twenty-two. Ten of these latter showed definite remains of tonsil in one or both fossæ, while three were doubtful. The presence of some tonsil tissue may account for the poor health in some of these thirteen cases, while in the nine others in which there is no tonsil remaining, one has chorea; three, bad teeth; two, nasal obstruction; and one has just recovered from an illness.

There was no change in the voice or speech in one hundred and sixteen cases, including the four in which the uvula had been partially or wholly cut off. This accident has had no ill effect, save a cosmetic one, in any case. In twenty-two cases the voice or speech was improved, i. e., it is clearer or more distinct or of better quality. In two, the voice or speech is said not to be so good. One boy talks somewhat through his nose, which he is said not to have done before the operation. His soft palate, uvula and faucial pillars are normal, but he has a nasal obstruction which probably accounts for the nasal voice. The other is said to talk at times through

the nose, but there is no apparent reason for this, as his throat is perfectly normal.

Forty-three cases showed one or more enlarged cervical glands. In not one of these cases were the glands causing any apparent symptoms or inconvenience of any sort. They were discovered on palpation of the neck. In seventeen cases a few small glands were present on both sides. In thirteen of these tonsil tissue was left on both sides. In three of the thirteen there were also decayed teeth. In five there were decayed teeth and no tonsil. In five others there was no tonsil tissue and no decayed teeth. In four cases there were several glands, and in eleven cases only one palpable gland under the left angle of the jaw. Eight of these fifteen cases showed the presence of a remnant of the tonsil on the left, and in one there was also a decayed tooth. In four there were decayed teeth and no tonsil, and in two there were no tonsil and no decayed teeth.

In three cases there were several and in five cases one gland on the right. In three of these eight cases there was some tonsil remaining on the right, and in three no tonsil, but decayed teeth. In these cases it is interesting to note that in most of the cases where there were glands present, there was still some tonsil on the same side. In five of the cases in which glands were felt, it was doubtful whether or not tonsil tissue remained. On the other hand, in twenty-six cases in which there were remains of the tonsil on one or both sides, there were no enlarged cervical glands. In four of the cases in which there were decayed teeth there were no enlarged glands.

Case.—S. B. F., female, age 8½ years, was seen in the neurologic department in March, 1909, where the following note was made: "Patient has general chorea, twitching of both arms and both legs so that she cannot walk, her mother says, or feed herself. Heart negative. Advise operation for tonsils." She also gave a history of frequent tonsillitis. Her tonsils were removed on April 1, 1909. When she came in to report it was stated that she was much improved in choreaic symptoms, but not cured. On examination, no tonsil tissue could be seen. She had one or two teeth with cavities and one pea-sized gland under the left angle of the jaw. She was sent to the dentist.

SUMMARY.

The patients, with few exceptions, were under fifteen years old at the time of operation.

Hemorrhage after tonsillectomy, calling for special treatment, is of rare occurrence.

The condition for which the tonsils were removed was relieved in very nearly every case, even in those in which there is still some tonsil tissue.

An improvement in the general health is to be expected after tonsillectomy done for cause.

Children who have had tonsillectomy certainly show no increased tendency to illness, and are probably less susceptible than before operation.

Present health is excellent in the great majority of cases.

What is apparently tonsil tissue is found much more often than one would expect after supposed tonsillectomy.

The soft palate was symmetrical and the faucial pillars and tonsil fossæ normal in the great majority of the cases.

The accidental cutting off of the uvula in four cases caused no bad symptoms.

Most of the cases of tonsillitis and sore throat were relieved by the operation.

In many of the cases in which there appeared to be remains of tonsil tissue the patients are in perfect health, and in others in which there were symptoms, they were undoubtedly due in many instances to other causes than the tonsil remnants.

The ordinary voice or speech may be said to be practically unaffected by tonsillectomy. No investigation was made as to the singing voice. In most of the cases in which enlarged cervical glands could be felt, there was tonsil tissue present on the same side.

On the other hand, in nearly half the cases in which tonsil tissue is still present, there are no enlarged glands.

Carious teeth were apparently a direct cause of some cases of cervical adenitis.

XXII.

REPORT OF REMOVAL OF FIBROMYOMA WHICH EXCLUDED THE AUDITORY CANAL; HEMOPHILIA.*

By M. D. Lederman, M. D.,

New York.

Mrs. N., 30 years of age, had had chronic suppurative otitis since early childhood. Ten or more years ago I removed a large growth from the left ear, and at that time there was considerable difficulty in arresting the bleeding. The ears ceased discharging after the operation for some years, and I did not see the patient again until three months ago, when she consulted me on account of a purulent bloody secretion from the same ear. She remarked that the ear had been moist for some time, but that she kept it quite clean by douching and a cotton applicator, but that of late she noticed that she was not able to get into the canal, as something obstructed the passage of the applicator. Furthermore, she had occasional headaches, and recalling her former trouble she sought my advice.

Examination showed the canal to be filled with the growth, the free end projecting from the opening of the meatus. Some foul-smelling secretion was found in the canal. No inflammatory symptoms of neighboring tissues were present. Prompt removal of the fibrous polyp was advised, to avoid retention of accumulating secretion.

As the patient desired a few days to get her household affairs in readiness, knowing that she would be detained in the hospital in case the bleeding should be unusual in character, calcium lactate was prescribed for four days, to increase the coagulability of the blood. She informed me that on one occasion a tooth had been extracted and that the dentist had experienced considerable difficulty in arresting the hemorrhage. Furthermore, she suffered from prolonged and exces-

*Read before the New York Academy of Medicine, Section on Otology, February 14, 1913.

sive menstrual periods. She also stated that when she struck herself against any hard substance on different parts of her body, subdermal ecchymosis resulted.

The technic of removing the large polyp was simple. Tampons soaked with cocain were placed around the attachment of the growth, as near the middle ear as they could be carried, and a few drops of a half per cent cocain solution were injected in the upper and inner portion of the meatus. The snare was readily carried around the growth to the membrana, and then drawing the wire taut a quick jerk of the instrument brought away the growth, which was over an inch long and a quarter of an inch in thickness. There was but little bleeding immediately following the removal of the growth, and I was about to laud the virtues of calcium lactate as a clot promoter. In a few minutes, however, a little blood began to ooze from the canal, so a packing of adrenalin-soaked gauze was introduced. This had no effect, as the blood continued oozing through the gauze without clotting. Other remedies were tried without success until 10 cc. of Mulford's horse serum were injected into the arm, and although the needle puncture bled for a few minutes, the oozing from the ear ceased in twenty minutes.

The canal was repacked, for safety, and the patient was transported to the Polyclinic Hospital for observation.

On attempting to clean the ear the following day, the bleeding again started, but was controlled by repacking. Within forty-eight hours, large urticaria of a hemorrhagic type were observed on the patient's right thigh and at the point of injection. These remained for over a week, causing considerable annoyance by the intense itching. This condition was no doubt due to the serum (anaphylaxis).

The ear soon became dry, and hearing was much improved. We must not overlook the fact that in the removal of these large fibroid polyps from the middle ear we might stimulate an existing infection in this cavity which may set up very serious complications. Mastoiditis and meningitis have followed the extraction of these hypertrophic tissues.

XXIII.

ABSCESS OF FRONTAL LOBE OF THE BRAIN, OF OTITIC ORIGIN, WITH EXHIBITION OF SPECIMENS.

By T. Passmore Berens, M. D.,

New York.

If the case of abscess in the frontal lobe of the brain that I am about to present to you is one of otitic origin, then—so far as I have been able to learn from a comprehensive search of the literature reaching back to 1869, made by Dr. A. Braun—it would seem to be unique. He has gathered together forty-nine cases, excluding the one that I present, of abscess in the frontal lobe, none of which was of otitic origin. Case No. 28, while presenting symptoms of mastoiditis, may be classified as a case of direct infection by extension from the ethmoidal labyrinth. I have given a short extract of each case, with its reference; but in order to save the time of this society I have also prepared a short table of the cases.

1. Frontal sinusitis.—Early headache; apathy; rigidity of neck. Autopsy: Abscess frontal lobe.

2. Frontal and ethmoidal sinusitis.—Persistent headache; optic neuritis; pulse 55 to 60; somnolence. Recovered after operation—frontal lobe abscess.

3. Frontal sinusitis.—Recovered after operation—frontal lobe abscess.

4. Frontal sinusitis.—Early headache; pain; temperature 100½°; increasing vomiting; incontinence urine; constipation. Autopsy: Abscess frontal lobe.

5. Pulmonary tuberculosis.—Conjugate deviation; pupils dilated; temperature 100 1/5°; delirium; stupor; hemiplegia. Autopsy: Multiple abscesses in frontal lobe.

6. Fractured base.—Pain in eye; apathy; hemiplegia; vomiting. Autopsy: Abscess frontal lobe.

7. Unknown etiology.—Headache; malaise; chills; temperature 99½°. Autopsy: Abscess frontal lobe.

8. Fractured skull.—Spasms of face extending to arm and leg; temperature 103.° Autopsy: Abscess frontal lobe.

9. Healed gunshot wound of head.—Headache; pupils unequal; stupor; twitching and slight hemiplegia; dysphagia. Autopsy: Abscess frontal lobe.

10. Frontal sinusitis.—Headache and vomiting; temperature 37½° C.; venous hyperemia of eyes. Operation revealed abscesses frontal lobe. No autopsy.

11. Ethmoiditis.—Apathy; exophthalmos; delirium. Autopsy: Abscess frontal lobe. Basilar meningitis.

12. Ethmoiditis.—Headache; vertigo; vomiting; apathy; hemiplegia. Autopsy: Abscesses frontal lobe. Hemisphere adherent to lamina cribrosa.

13. Nasal.—Abscess frontal lobe.

14. Fracture frontal bone.—Apathy; incontinence of urine; prolapse of brain tissue—removed by thermocautery opening anterior horn of lateral ventricle; three and one-half months later bulging of scar; erotic mania and convulsions; spontaneous rupture. Disappearance of symptoms.

15. Frontal sinusitis.—Abscess frontal lobe.

16. Frontal sinusitis.—Multiple abscesses frontal lobe.

17. Panophthalmitis.—Temperature 39° C.; coma. Autopsy: Diffuse meningitis. Abscess frontal lobe.

18. Frontal sinusitis.—Optic neuritis; coma; hemiplegia; headache. Recovery after three operations for recurring abscesses in frontal lobe.

19. Trauma.—Headache; apathy; emaciation; hemiparesis; neuritis; pulse and temperature normal; symptoms of meningitis. Operation: Abscess frontal lobe. Recovery. One year later recurrence; unconsciousness; death. No autopsy.

20. Trauma of orbit.—Convergent squint; apathy; loss of memory; later proptosis; choked disc; temperature subnormal; pulse 80. Operation: Abscess frontal lobe. Recovery. Later, operation motor area abscess. Recovery.

21. Tubercular bronchiectatic cavities.—Facial paralysis; Jacksonian epilepsy, beginning right arm; hemiplegia. Autopsy: Two abscesses frontal lobe.

22. Tubercular bronchiectatic cavities.—Mental dullness; apathy; temperature 97 to 99°; pulse 84; no other symptoms of brain involvement. Autopsy: Abscess frontal lobe.

23. Frontal sinusitis.—Irritability; optic neuritis. Operation: Abscess frontal lobe. Recovery.

24. Frontal sinusitis.—Slow cerebration; pulse 48. Operation: Abscess frontal lobe. Recovery.

25. Pansinusitis.—Operation: Epidural abscess. Frontal lobe abscess. Death.

26. Ethmoiditis.—Paralysis arm and leg; coma. Operation: Frontal lobe abscess. Death.

27. Frontal sinusitis.—Intermittent headaches; convulsions. Two operations. Frontal abscess. Recovery.

28. Ozena. Acute Mastoid.—Symptoms: Mental dullness; headache. No operation. Autopsy: Abscess frontal lobe with dura adherent to ethmoid.

29. Frontal sinusitis.—Headache; apathy; temperature subnormal; pulse 56. Operation. Autopsy: Frontal lobe abscess.

30. Frontal sinusitis.—Dullness of intellect. Operation: Frontal lobe abscess. Unconsciousness; hemiplegia. Second operation: Motor area. Abscess found. Death.

31. Traumatic ethmoiditis.—No localizing symptoms. Autopsy: Necrosis cribriform plate. Frontal lobe softened and infiltrated with pus.

32. Pansinusitis.—Headache; delirium. Operation: Cyst of frontal lobe. Autopsy: Basilar meningitis. Abscess frontal lobe.

33. Frontal sinusitis.—Stupor; vomiting. Operation: Frontal lobe abscess. Recovery.

34. Gunshot wound.—Headache; irritability; optic neuritis left. Retrobulbar neuritis right; increasing hemiplegia. Operation: Frontal lobe abscess. Recovery.

35. Traumatism.—Temperature 99 to 104°; arm and leg paralyzed; retinal vessels tortuous; hemiplegia; coma; convulsions. Operation: Frontal lobe abscess.

36. Frontal sinusitis.—Headache; one-sided convulsions. Operation: Abscess frontal lobe. Death.

37. Perforating trauma.—Vomiting; general convulsions. Autopsy: Abscess frontal lobe.

38. Trauma.—Baby ten and one-half months old. Severe pain; twitching and paralysis arm and leg; fever; coma; pupils equally dilated; circumference of head increased. Autopsy: Abscess frontal lobe.

39. Trauma.—Vomiting; coma; tremor one side. Autopsy: Abscess frontal lobe.

40. Trauma.—Twitching arm and leg; epileptiform seizures. Operation: Abscess frontal lobe. Recovery.

41. Penetrating trauma.—Temperature 39° C.; pulse 45; right hemiplegia; left ptosis. Operation: Abscess frontal lobe. Recovery.

42. Necrosis frontal bone.—Vomiting; fever; convulsions; anesthesia of left face; diminished hearing left; paralysis left sixth nerve; loss of speech; ulceration of cornea; coma. Autopsy: Extensive necrosis of frontal bone; purulent meningitis. Abscess frontal lobe.

43. Frontal sinusitis.—Headache; convulsions; hemiparesis. Operation: Brain hernia formed, then removed, liberating pus. Temporary relief (one month). Convulsions six months. Coma. Death. Autopsy: Frontal lobe abscess. Purulent basilar meningitis.

44. Trauma of orbit.—Convulsions. Operation: Frontal lobe abscess. Recovery.

45. Cause unknown.—No paralysis; no convulsions. Clinical picture of tubercular meningitis. Frontal lobe abscess.

46. Trauma.—Headache; somnolence; vomiting; pulse slow; respirations slow; temperature normal; patellar reflexes diminished; pupils unequal; paresis left internal rectus; double optic neuritis; convulsions; pleurosthotonus. Operation: Abscess frontal lobe. Recovery.

47. Trauma.—Headache; somnolence; temperature 100°; pulse 60; vomiting; Jacksonian epilepsy; hemiplegia; temporary aphasia. Autopsy: Abscess frontal lobe.

48. Acute ethmoiditis.—Mentality dull; knee-jerk absent; optic neuritis. Autopsy: Pus in ethmoid. Abscess frontal lobe.

49. Orbital abscess.—Headache; vomiting; pulse 64; temperature normal; Jacksonian epilepsy. Autopsy: Frontal lobe abscess and orbital abscess.

Case 1.—Redtenbacher: "Hirnabszesse und Eiterung im Sinus frontalis nach Influenza." *Wiener medizinische Blätter*, 1892, 13, Female, 34 years of age. Had an attack of influenza. A few days later redness and swelling of left upper eyelid. Then clonic spasms. Headache. Three weeks later, weakness of right half of body. Abscess of eyelid was opened. Did not heal. Apathy and rigidity of neck. Death three months later. Postmortem showed pus in the frontal

sinus, with necrosis of its posterior wall. Dura adherent to this wall. At the apex of the frontal lobe, a nut-sized abscess.

Case 2.—A. Denker: "Rhinogener Frontallappenabszess und extraduraler Abszess in der Stirngegend, durch Operation geheilt." *Archiv. f. Laryng. u. Rhin.*, 1900. Male, 17 years of age. Pain in region of left temple and eye. Foul odor from nose. Diagnosis of left frontal sinusitis and ethmoiditis was made. Intranasal operation. A month later, external operation. Two weeks later the headaches became worse, there was somnolence, there was blurring of the left optic disc, and the pulse was 55 to 60. The posterior wall of the frontal sinus was removed, and an epidural abscess was exposed. The dura was incised. Brain tissue was aspirated and pus found. Brain incised and abscess evacuated. Recovery.

Case 3.—J. Herzfeld: "Rhinogener Stirnlappenabszess, durch Operation geheilt." *Berliner klinische Wochenschr.*, 1901, No. 47. Male, 20 years of age. Six weeks before admission he had coryza. Two weeks ago, left-sided frontal headaches. Diagnosis of left frontal sinusitis was made. External operation. Posterior wall of frontal sinus was found carious and removed. An epidural abscess was found. The dura was incised. A subdural abscess was evacuated. When this pus was wiped away, a fistula was seen in the frontal lobe of the brain. The fistula was enlarged with forceps, and a finger introduced into the abscess cavity. Iodoform gauze packing. Recovery.

Case 4.—E. S. Steese: Medical and Surgical Report of the Presbyterian Hospital, 1898. (1)—C. S., 17 years of age. Six weeks ago sudden severe pain in both eyes, dimness of vision and vomiting. Pain lasted three weeks and then vanished. Mental dullness, delirium and stupor. Increasing difficulty in swallowing and breathing. Patellar reflexes absent. Pupils dilated. Pulse about 50, temperature 100.5° F. Vomiting, incontinence of urine, constipation, death. Postmortem showed frontal sinus disease. Abscess in left frontal lobe, three-fourths inch in diameter. There was a perforation in posterior wall of frontal sinus.

Case 5.—(2) C. S., 39 years of age. Phthisis for several months. Two weeks ago, paralytic stroke, during sleep. Delirium and stupor. Left hemiplegia. Occasional clonic spasm

of left side, with spasmodic conjugate deviation. Right patellar reflex increased, and ankle clonus. Pupils dilated. Respiration stertorous. Temperature averaged 100.2° F. Death four weeks later. Postmortem showed an abscess one inch in diameter at upper end of fissure of Rolando. Another in occipital lobe. A large cavity in left frontal lobe.

Case 6.—(3) A. H. Fracture at base of skull. Trephined in frontal region, and considerable fluid withdrawn. Six months later pain over right eye. Apathy and left hemiplegia. Patellar reflexes lost. Respirations shallow. Vomiting. Death. Postmortem disclosed a large abscess in right frontal lobe. A few foci of suppuration were also found at the top of the left parietal lobe.

Case 7.—(4) B. J., 25 years of age. One week ago headache, malaise and chills. Temperature averaged 99.5° F. Death after a week. Postmortem showed flattening of the convolutions of the brain, and an abscess one inch in diameter in left frontal lobe. Entire lobe softened. Etiology unknown.

Case 8.—(5) Female. Was struck by cable car and received a linear fracture of the skull. Spasms, commencing in left side of face and extending to arm and leg. No paralysis. Temperature averaged 103° F. Duration three days. Death. Postmortem disclosed two large abscesses in the frontal lobe. Laceration of cerebellum. Pneumonia. Mucopus in smaller bronchi of both lungs.

Case 9.—(6) M. S., 45 years of age. Bullet removed from head ten months ago. Headache, stupor, twitching of right hand and leg, and slight paralysis of left side. Difficulty in swallowing. Right pupil dilated, and left contracted. Rigor. Death. Postmortem: Entire right frontal lobe honeycombed with abscess cavities.

Case 10.—M. Paunz: "Ueber den rhinogenen Hirnabscess." *Arch. f. Lar. u. Rhin.*, 1902-3, Vol. 13. Female, 16 years of age. Acute left frontal sinusitis. Headache and vomiting. Temperature 37.5° C. Pulse 60 to 66. Dilated, sluggish pupils. Venous hyperemia of the eye grounds. Operation: Small frontal sinus was found. Dura was exposed and found bulging. Aspirated pus through dura. Incision of dura and brain substance. About 80 cc. of pus evacuated. Death six months later.

Case 11.—H. Maas: "Zur Casuistik und Therapie der Gehirnabszesse nach eigenen Erfahrungen." *Berliner klin. Wochenschr.*, 1869. Male, 45 years old. Nasal polypi. Removed several times. Frequent nosebleed. Apathy. Vertigo. Nasopharyngeal polyp. This, as well as the nasal polypi, removed. Patient was somewhat relieved. Followed after several days by increase in the apathy. Exophthalmos, delirium and death. Postmortem showed dura at the base of the skull covered with pus. The lamina cribrosa and upper surface of the sphenoid was destroyed. Abscess in the frontal lobe of the brain, above ethmoidal region.

Case 12.—D. Jacubasch: "Abszess im vorderen rechten Gehirnlappen." *Berliner klin. Wochenschrift,* 1875. Male, 20 years old. Had sore in nose. Dull headache, vertigo and vomiting. Speech slow and difficult. Pulse 56. Evening temperature 38° C. For several weeks no change. Then apathy. Pain in back of neck. Left-sided hemiparesis. A month later, death. Postmortem: Right hemisphere adherent to lamina cribrosa. Large abscess in right frontal lobe. A second abscess further back.

Case 13.—Seifert: "Abscess of frontal lobe of nasal origin. *Revue hebd. de laryngol.*, etc., 1905.

Case 14.—Borchard: *Arch. f. klin. Chirurgie,* 1904, Vol. LXXIV. Female, 8 years old. Was kicked in left side of forehead by horse's hoof. Frontal bone fractured. Brain tissue exposed. Loose fragments of bone were removed. Dressing. Child apathetic. Passed urine involuntarily. Prolapse of brain tissue removed with thermocautery. This opens up anterior horn of lateral ventricle. Patient discharged six months later. Three and a half months later she was readmitted. Five days before her readmission the old scar began to bulge. She developed symptoms of erotic mania, and had several convulsions. The swelling ruptured spontaneously and evacuated pus. This was followed by disappearance of the mental symptoms. The swelling with recurrence of the mental symptoms reappeared several times in the course of the next few years.

Case 15.—Cisneros: "Abscess of the frontal lobe following frontal sinusitis." *Revue hebd. de laryngol.*, etc., 1905.

Case 16.—R. Hoffmann: "Multiple abscesses of the brain, resulting from bilateral traumatic frontal sinusitis." *Arch. internat. de laryngol.*, 1906.

Case 17.—W. Reis: "A case of panophthalmitis with brain abscess and fatal meningitis." *Arch. f. Augenheilk.*, 1905. Male, 37 years of age. Was struck in left eye with stick a week before. Panophthalmitis. Eyeball was incised and pus evacuated. Five days later, severe headache, temperature 39° C., coma, and death the same evening. Postmortem showed a diffuse meningitis and an abscess in the anterior part of the frontal lobe.

Case 18.—L. B. Rawling: "Case of Chronic Abscess of the Frontal Lobe." Transactions of the Medical Society of London, 1907. Male. Frontal headache with edema of the right upper eyelid, in May, 1905. Roof of orbit was exposed and found bare of periosteum. On June 1st, coma and paralysis of left side of body and face, vomiting, optic neuritis, slow pulse and subnormal temperature. Skull was opened so as to expose outer and anterior aspect of frontal lobe, and an abscess was found. Rapid recovery. Discharged cured in the middle of July. In 1906, return of the same symptoms. A similar operation was performed and another abscess found. Recovery. On October 13, 1906, he was admitted for the third time. Marked bulging at the site of former operations. Drowsy and irritable. Severe headache. Left hemiplegia. Abscess was not found. Marked hernia. On October 24, again operated and abscess found. Recovery. At a later date frontal sinus was opened and found to contain pus and carious bone.

Case 19.—F. L. Taylor: "A Case of Abscess of the Frontal Lobe of Traumatic Origin." *New York Medical Journal*, May, 1908. Male, 27 years of age. Was struck with a brick above the right eye in May, 1906. Was not rendered unconscious. A month later, superficial abscess was opened. Later, headache, apathy, emaciation, optic neuritis, slight paresis of the left side of the face, and weakness of grip in left hand. Stiffness of back of neck, vomiting, incontinence of urine and feces. Pulse and temperature normal. Operation showed abscess in frontal lobe on right side. Recovery, with poor vision. In October of the following year he became unconscious, had several convulsions, and died.

Case 20.—Coulter: *Ophthalmoscope*, 1909. Female, 24 years of age. Piece of wood, one and one-half inches long, was driven into the left orbit, through the upper eyelid. Re-

moved. This was followed by a convergent quint and diplopia. Swelling in upper outer angle of orbit. Incised. Three months later: apathy, loss of memory, pulse 80, temperature subnormal. Both eyes were proptosed. Left external rectus was paralyzed. Choked disc. The skull was trephined behind the external angle of the left orbit. Abscess was found in frontal lobe. A month later, right arm and leg began to twitch. Trephined over motor area, and another abscess tapped. Cure.

Case 21.—Schorstein: *Lancet,* 1909. (1) Male, 33 years of age. Tuberculosis, with bronchiectatic cavities. Coma. Facial paralysis left. Muscular spasm, beginning in right arm. Seven days later, hemiplegia of right side. Three days later, death. Two abscesses were found in left frontal lobe on autopsy.

Case 22.—(2) Male, 21 years of age. Tuberculosis, with bronchiectatic cavity. Dullness and apathy. No other symptoms of brain involvement. Pulse 84. Temperature 97° to 99° F. Postmortem showed abscess in right frontal lobe.

Case 23.—L. V. Cargill—Wm. Turner—St. Clair Thomson: "A Case of Abscess in Left Frontal Lobe Originating from Suppuration in Left Frontal Sinus." Proceedings of the Royal Society of Medicine, 1907-1908. Male, 31 years of age. Patient had an orbital cellulitis, which was incised. Fourteen days later, irritability and optic neuritis. Frontal sinus was opened and posterior wall found necrotic. Brain covered with granulations. Abscess in frontal lobe evacuated. Recovery.

Case 24.—M. P. Laurens: Proceedings of Parisian Society of Laryngology, Otology and Rhinology. Abstracted in *Journal of Laryngology,* 1908. Slow cerebration, pulse 48. Chronic frontal sinusitis. Operation: Posterior bony wall intact. Infection of brain, either through venous or lymphatic channels. Abscess in frontal lobe, size of mandarin. Recovery.

Case 25.—L. M. Hurd: Transactions of American Laryngological, Rhinological and Otological Society, 1910. Discussion to Dr. McCoy's paper. Chronic pansinusitis, epidural abscess, frontal lobe abscess, meningitis and death.

Case 26.—J. McCoy: Transactions of American Laryngological, Rhinological and Otological Society, 1910. (1) J. L.,

one and one-half years of age. Ethmoiditis. External operation, Osteomyelitis of vertical plate of frontal bone. Epidural abscess. About three weeks later, paralysis of right arm and leg. Ten days later, coma. Frontal lobe opened. Large quantity of pus evacuated. Death.

Case 27.—(2) H. E., 10 years of age. Frontal sinusitis left. External operation was done by an eye surgeon. Two months later necrotic bone in posterior wall of frontal sinus was removed. Dura covered with granulations. This was followed by intermittent headaches. Two months later, convulsions. Large abscess found in frontal lobe of brain. Five days later, another connecting abscess was found. Counter opening was made in temporal region, and through and through drainage instituted. Recovery.

Case 28.—Thos. Hubbard: Transactions of American Laryngological, Rhinological and Otological Society, 1903. Woman, 25 years of age. Ozena. Acute mastoditis. No operation. Two months later, mental dullness and headache. Mastoid tenderness and death. Autopsy showed dura adherent to under surface of right frontal lobe. Small abscess in center of frontal lobe.

Case 29.—Fagge: Guy's Hospital Reports, 1909, Vol. 63. J. R., 60 years of age. Empyema of frontal sinus. Radical operation. Headache, apathy, subnormal temperature and pulse of 56. Operation showed abscess in frontal lobe on left side. Death. Postmortem showed abscess extending from orbital surface of frontal lobe nearly to anterior horn of lateral ventricle.

Case 30.—J. A. White: Transactions of American Laryngological, Rhinological and Otological Society, 1910. Discussion to Dr. McCoy's paper. Chronic frontal sinusitis. No symptoms of brain involvement, except some dullness of intellect. Operation evacuated frontal lobe abscess. Following operation, unconsciousness. Two days later, lost use of right arm and muscles of face. Opened another abscess in region of Rolandic fissure. Death.

Case 31.—Stucky: ANNALS OF OTOLOGY, RHINOLOGY AND LARYNGOLOGY, June, 1907. Traumatic ethmoiditis, with meningitis and abscess of frontal lobe. No localizing symptoms. Postmortem showed no disease of pia or dura, except over cribriform plate, which was necrotic. Fracture through inner

table of left frontal sinus. Anterior and middle cerebral convolutions softened and infiltrated with pale green pus.

Case 32.—Stucky: *Cleveland Medical Journal,* March, 1911. Female, 49 years of age. Pansinusitis. Posterior wall of frontal sinus necrotic. Dura exposed and covered with granulations. Headache and delirium. Improved and was well for three months after operation. Then recurrence of pain. Dura opened and cyst of frontal lobe found, containing one and one-half ounces of thin straw-colored fluid. Died of sepsis four months later. Postmortem: Dura thickened and adherent to brain in frontal and temporosphenoidal region. Base of brain bathed in cloudy fluid. Entire right frontal lobe contained large cavity filled with creamy fluid. Walls of cavity one-fourth inch thick. Anterior half of right temporosphenoidal lobe also disintegrated.

Case 33.—Hans Rische: *Zeitschr. f. Ohrenheilk.,* Vol. 62. Male, 19 years of age. Headache and swelling above left eye. Incised and pus evacuated. Temperature 37 to 38° C. Pulse 60. Stupor, vomiting. No pus in nose. External frontal sinus operation. Posterior wall of frontal sinus showed small perforation. Dura covered with granulations. Dura incised. Abscess in frontal lobe evacuated. One-half to two drams. Recovery.

Case 34.—Foster Kennedy: *Journal of Nervous and Mental Diseases,* 1911. Struck over right frontoparietal region with spent bullet. Bullet entered bone, but did not penetrate cranial cavity. Six months later, headache and irritability. Optic neuritis on left side. Slight left facial weakness. Cerebrospinal fluid normal. Wassermann reaction in fluid positive. No history of syphilis. Loss of smell on right side. Retrobulbar neuritis of right side. Gradually increasing left hemiplegia. Operation showed large abscess in frontal lobe. Recovery.

Case 35.—Ernest Sachs: *Journal of Nervous and Mental Diseases,* 1911. Boy, 4 years of age. Two weeks before admission, fell and struck on forehead. Dull and irritable. On day of admission, right arm and leg became suddenly paralyzed. Temperature 99 to 104° F. Lumbar puncture gave clear sterile fluid. Three days later, unconsciousness, and convulsions more marked on the right side. Vessels of left retina tortuous. Operation. Frontal lobe abscess.

Case 36.—W. Freudenthal: *International Journal of Surgery*, September, 1908. Miss J. S., 25 years of age. Acute right frontal sinusitis. Headache and nasal discharge. Edema of right eye. Killian operation. Posterior wall of sinus eroded. Dura bulging. Dura incised. Two ounces of pus evacuated. Following operation several attacks of convulsions on left side. Death several days later. No autopsy.

Case 37.—Youl: *Lancet*, 1847; abstracted by Holt, *Archives of Pediatrics*, 1898. Child, 8 months old. Received wound in temporal region with some sharp body which healed. Two weeks later, vomiting and general convulsions. Died in one hour. Autopsy showed abscess containing two ounces of pus, in frontal lobe, at point opposite scar of external wound. Surrounding brain tissue much disorganized. Abscess communicated with lateral ventricle.

Case 38.—Wyss: *Jahrb. f. Kinderheilk.*, IV; abstracted by Holt in *Archives of Pediatrics*. Boy, 10½ months old. Fell several feet and struck on head. Four days passed before first symptoms occurred. Sudden onset with crying and severe pain at night, followed in ten hours by twitching of right arm and leg. Eight days later, paralysis of right arm and leg. Fever. Circumference of head increased. Six weeks after onset, coma. Pupils equally dilated. Six to eight convulsions daily, during one of which the child died. Autopsy showed left hemisphere larger than right, owing to an enormous abscess involving almost the entire frontal lobe. No communication with ventricles, which were distended with clear serum.

Case 39.—Koehler: *Irrenfreund*, Heilbrunn, 1879, Vol. XXI; abstracted by Holt in *Archives of Pediatrics*, 1898. Boy, 18 months old. Fell, striking head against a file, which penetrated frontal bone. Four weeks later scar was inflamed, and piece of file, one inch long, was removed. Later, vomiting and coma. Small swelling appeared at aperture in frontal bone, which pulsated and was easily reduced. Pus removed by aspiration and patient improved. Coma again developed, but upon aspiration no pus. Tremor of left half of body. Death in coma. Postmortem: Abscess size of egg in left frontal lobe, communicating with opening in frontal bone and with left lateral ventricle. Pus had penetrated through the foramen of Munro into right ventricle. Third and fourth ventricles also contained pus.

Case 40.—Borelius: *Jahrb. f. Kinderheilk.,* Vol. XXXII; abstracted by Holt in *Archives of Pediatrics,* 1898. Boy, 4 years old. Fell upon splinter of wood, which punctured upper eyelid. One week later, lid swollen and epileptiform seizures and other cerebral symptoms. No paralysis, but twitching was more marked in left arm and leg. Deep incision was made in upper eyelid, and large amount of pus evacuated. Probe passed through roof of orbit into frontal lobe. Drainage tube inserted, and patient recovered. Discharged in one month.

Case 41.—Zdekauer: *Jahrb. f. Kinderheilk.,* 1893, Vol. XXXV; abstracted by Holt in *Archives of Pediatrics,* 1898. Boy, 3¾ years old. Fell upon nail, which pentrated left side of head. Five days later fever, right hemiplegia and left-sided ptosis. Temperature 39° C., pulse 45. Over left temporal bone, wound from which pus discharged. Operation performed, during which dura was found to be fluctuating. Puncture of dura released two ounces of green foul-smelling pus. Drainage tube inserted. Recovery, except for paresis of left hand.

Case 42.—Reiner: *Jahrb. f. Kinderheilk.,* XI; abstracted by Holt, in *Archives of Pediatrics,* 1898. Male, 3 years old. Rickets. Cerebral symptoms of six weeks' duration. Bone disease for two and a half months. Then vomiting, fever and convulsions. Headache of left side and anesthesia of left side of face. Diminished hearing on left side and paralysis of left sixth nerve. Convulsions and high fever, loss of speech and loss of consciousness. Cornea ulcerated and perforated. Death in ten days. Postmortem showed large abscesses occupying nearly whole of left frontal lobe. Turbid serum in ventricles. Purulent meningitis at convexity and on left side of base. Extensive necrosis of frontal bone. Dura was adherent here and greatly thickened.

Case 43.—Treitel: "Ueber Hirnabszesse nach Stirnhoehleneiterung." *Deutsche med. Wochenschr.,* 1898, Vol. 22. Female, 22 years of age. In March, 1894, nasal obstruction, purulent discharge from left side of nose and pain in forehead and cheek. Polypi were removed from left side of nose on several occasions, as well as middle turbinate. In December, 1894, severe headache on left side of forehead. External operation on frontal sinus. Posterior wall was rough.

Pain did not disappear after the operation. In April, 1895, she was operated by Dr. Rotter. He found dura exposed over an area of one cm. A larger exposure was made and the brain punctured. No pus was found. On May 20th, repeated convulsions. Hemiparesis of right side. Pulse normal. Pupils equal and reacted well. Eye grounds normal. On May 22d, repeated punctures of brain were made. No pus found. Brain hernia followed. After two weeks, portions of this became gangrenous. This was removed and base cauterized. About a dram of pus escaped. On August 6th, patient was discharged, although wound still secreted pus and the hemiparesis remained. On September 11th, she was readmitted and frontal sinus again operated on. In October, convulsions. In March, 1896, the ethmoids were removed. On March 21st, death during a convulsion. Postmortem: Over left frontal lobe dura adherent to brain. Large abscess in frontal lobe. Basal surface of frontal lobe hemorrhagic. Purulent basillar meningitis.

Case 44.—J. M. Lee: "Abscess of Frontal Lobe of Brain and Convulsions Due to Accidental Puncture of the Orbital Roof." *Homeopathic Eye, Ear and Throat Journal,* 1897, III. Male, 12 years of age. Fell on stub of weed, which penetrated right upper eyelid, and passed through sphenoidal fissure into frontal lobe of brain. Wound healed without medical treatment. Six months later, convulsions. Small suppurating point on lid incised, and finally a piece of the stub worked out. Wound healed. A year later spasms reappeared, and lasted three weeks. Cicatrix again opened, and piece of stub removed. He was not troubled for nearly a year, when convulsions returned, and lasted six months. A third incission revealed no foreign body. Spasms subsided again. A year later they reappeared. Eye grounds normal. A U-shaped flap was made on forehead. Two buttons of bone were removed by trephine. Dura bulged and showed a small opening through which seropus discharged. Dura was incised, and cavity was seen in frontal lobe. Drainage. Spasms disappeared in one week.

Case 45.—Hanot: *Archiv. Gen. de Med.,* Paris, 1890. Large abscess of frontal lobe, without paralysis or convulsions, giving during life the clinical picture of tubercular meningitis.

Case 46.—Wm. MacEwen: "The Pyogenic Infectious Dis-

eases of the Brain and Spinal Cord."—(1) Boy, 11 years of age. Was admitted on May 9, 1889. Ten weeks before, he was struck by a stone on the forehead, an inch above the left eyebrow. The boy was unconscious for half an hour. The wound healed in three weeks. Beginning four days after the injury, there occurred headaches, which gradually increased in intensity. For six weeks past, somnolence and repeated attacks of vomiting. About a month before admission there occurred, after the vomiting, profuse perspiration. Pulse was slow and weak; respiration slow and irregular; temperature normal. Patellar reflexes were diminished. Pupils were unequal, the left the smaller. Reaction normal. Slight paresis of the left internal rectus. Bilateral optic neuritis. On May 17th, convulsions in both arms, but most marked in the right. Then pleurosthotonus to left side. Operation without narcosis. Incision through the scar disclosed carious bone. This was removed and an area of thickened dura was exposed. Dura was incised, showing pia adherent to it, and inflamed. An aspirating needle encountered pus in the frontal lobe an inch from the surface. Abscess opened, and decalcified bone drainage tube inserted. Immediately after operation there was an increase in rapidity of pulse and respiration. Consciousness returned. Gradual improvement of all symptoms.

Case 47.—(2) Boy, 11 years of age. Admitted in 1876. Two weeks before admission he fell and struck his forehead upon the floor. Six days later, headache. On admission, wound, one and one-half inches long, was seen above left eyebrow. Roughened bone could be felt at the bottom. Somnolence. Rectal temperature, 100° F., pulse 60 to 65. Six days later, vomiting. The following day, chills. In the evening, temperature 103° F. Five days later, i. e., twenty-six days after the injury, convulsions, beginning in the right side of the face and extending to the right arm and leg. This followed by paralysis of the right side, and aphasia. The aphasia lasted an hour, then disappeared. Paralysis improved after several hours. Diagnosis was made of abscess in third frontal convolution, between speech center and internal capsule. Operation was refused. Two days later, death. A partial postmortem was allowed. A plate of bone was removed from the temporal region, the upper margin of which corresponded to the third frontal convolution. An extradural

exudate was disclosed, and hyperemia of the dura. The dura was incised and reflected, and the brain incised. At a depth of one inch from the surface an abscess was encountered.

Case 48.—R. T. Williamson: "A Case of Abscess in the Right Frontal Lobe of the Brain." *Medical Chronicle,* 1890-91. Male, 19 years of age. Admitted March 22, 1890. On Februay 18th, influenza with profuse nasal discharge and frontal and occipital headache. Mentality dull. This dullness became progressively more marked. Knee jerks absent. Optic neuritis in right eye. Temperature between normal and 106.4° F., antemortem. Death on April 4th. Postmortem: Large abscess in anterior part of right frontal lobe. A small amount of pus in right ethmoidal cells.

Case 49.—J. C. Renton: "Notes on a Case of Cerebral Abscess, Subsequent to Orbital Periostitis." *Glasgow Medical Journal,* 1886. Male, 12 years of age. Admitted October 17, 1884, for what appeared to be a right orbital cellulitis of ten days' duration. On October 22d, an incision was made along the inner side of the upper eyelid, with evacuation of pus. On October 28th, severe headache, pulse 64, temperature normal. Vomiting. On November 11th, spasms of left side, which soon became general and ended in death on the same day. Temperature was never higher than 99° F., being generally 97.6° F. Postmortem: Convolutions over right frontal lobe, slightly flattened. Right orbital plate necrosed. Dura inflamed over this area. Abscess in anterior half of right frontal lobe. Abscess cavity lined by distinct membrane. There was no direct communication between the pus from the orbit and the cerebral abscess.

Case 50.—J. S., male, 27 years of age, entered my service at the Manhattan Eye, Ear and Throat Hospital on November 10, 1912, suffering from slight deafness in the right ear, of seven years' duration; intermittent purulent discharge; pain in the right ear for two weeks; mastoid tender; drooping superior wall of canal. Mother died of apoplexy at the age of 52. The patient never had had any serious illness. Venereal disease denied. Occupation, glass blower and prize fighter.

On November 12th, under gas ether anesthesia, I performed a Schwartze-Stacke radical operation. The mastoid was partly pneumatic, partly eburnated, and contained much pus. The

middle ear and the attic contained much granulation tissue, and the malleus and the incus were necrosed. The stapes was located and was not disturbed. Neither the dura nor the sinus was exposed. A flap was made and the wound sutured behind. Packed with sterile gauze.

The wound pursued an uneventful course, and he was transferred at the end of eight days to the out-patient department for dressings.

On November 28th, sixteen days after the operation, while being dressed in the clinic by a member of the house staff, the patient had a sudden gush of blood from the middle ear cavity. The cavity was quickly packed with iodoform gauze, but the bleeding was not controlled. The hemorrhage was profuse, flowing through the gauze packing in a stream off the chin. It was checked by Dr. Stucky, the house surgeon, who repacked firmly with iodoform gauze. The patient was placed in bed. He was weak and pale, but the pulse was of fair quality. Temperature remained below 100.° A full dressing was done on the fourth day after the hemorrhage, when the wound looked clean.

On the morning of the fifth day (December 4th), at 5:30 o'clock, the patient had a convulsion, lasting from five to six minutes. He was not seen by a doctor during this convulsion. The nurse described it as "severe," "the patient shaking all over, the head retracted, with frothing at the mouth and gripping at the bed clothes with both hands." The house surgeon arrived as the convulsion was over. He described the condition as follows: "Cold perspiration over the entire body. Both pupils markedly contracted, equal and reacted to light. The patient could not be aroused to answer questions. The pulse was full, strong, regular, 84; temperature, rectal, 102.° Respirations 34. A full dressing was done and the wound looked healthy."

Fifteen minutes later there was another convulsion, lasting for a few minutes. This was also over before the house surgeon could be summoned. At 9 a. m., the temperature was 99,° respirations 22, pulse 112. At 3 p. m., the temperature was 100.8,° respirations 24, pulse 116. Blood count: Leucocytes 15,000; polymorphonuclear leucocytes, 89 per cent; small lymphocytes, 7 per cent; large lymphocytes, 4 per cent. Wassermann positive on December 10th. Blood culture neg-

ative. Spinal fluid under high pressure, but clear and "non-meningitic," according to chemical tests by Drs. Kopetzky and Callison. Color clear, copper reducing substance present. Lactic acid, marked reaction. Noguchi test weakly positive. Hydrochloric acid precipitation test negative. No polymorphonuclear leucocytes in stained smears. Culture negative. Urine negative, except for faint trace of albumin. Eyes, fundi normal. (Drs. Webster, Thomson and Van Fleet.) After the convulsions, the patient lay with eyes closed and drawn expression, but usually quiet. He complained only of headache, and if asked how he felt he replied, "All right, except for a dull headache." Asked to localize the headache, he said that it was "over the whole right side of the head and forehead." The headache persisted and the patient very gradually became stuporous. The whole right side of the head became tender to percussion. He did not answer questions promptly, but up to two hours before he became comatose answered intelligently. He remembered his name, age, address, and could give a good history of his trouble. The temperature never went higher than 102,° nor lower than 99.4.° The pulse was never lower than 80, until December 10th, when it varied between 60 and 78—always full and regular. On December 6th, Kernig was negative, Babinsky negative, no ankle clonus, no stiff neck. On December 10th, Kernig positive, Babinsky positive, the neck stiff, no ankle clonus. On December 11th, Kernig positive, Babinsky positive, ankle clonus very marked and equal, and neck stiff. The patient had an attack of typical Jacksonian epilepsy, beginning in the toes of the left foot and extending over the whole left side.

The patient was at once placed on the table, and the middle cerebral fossa was exposed by removing the tegmen. Incision through the dura gave two to three ounces of thick, creamy, foul pus, which seemed to flow from the anterior limit of the incision. The brain tissue protruded rapidly until a hernia of the brain filled the bone wound. Examination of the brain substance with a knife in all directions, failed to locate any deep abscess. A cigarette drain was inserted. After the operation, temperature was 102,° pulse 124, respirations 22. Intravenous saline infusion, on the table. The patient never regained consciousness. The temperature re-

mained between 102° and 103,° until December 15th, just before his death.

Autopsy by Drs. Braun and Friesner and Stucky. There was a large subdural abscess over the right hemisphere, extending posteriorly to the posterior limit of the parietal lobe. There was a large abscess (See Fig. 1), the size of a hen's egg, thick-walled, full of greenish-yellow, foul pus, occupying most of the right frontal lobe; this abscess had burst and drained into the subdural space and probably was the source of the subdural abscess. The accessory sinuses of the nose were absolutely normal. The internal carotid artery contained a clot and was eroded at the knee, where there was a dehiscence of the bone. (See Fig. 2.)

This case presents several points of great interest to me.

First.—There was no doubt, early in the case, that there was intracranial pressure; and early exploration of the brain was not undertaken because there was no localizing symptom. The attack of Jacksonian epilepsy was the first localizing symptom.

Second.—Exposure of the dura through perfectly healthy bone of the tegmen of the antrum and the attic revealed what at the time of operation was supposed to be a superficial absess in the temporosphenoidal lobe of the brain.

Third.—The presence of a large deep abscess was strongly suspected, because of the rapid formation of the large hernia of the brain, and the brain was thoroughly, though fruitlessly, explored.

Fourth.—The finding of an unsuspected abscess in the frontal lobe, the fact that it had burst, and the fact that the pus from it was the cause of the subdural abscess.

Fifth.—The pus from the abscess showed no growth after forty-eight hours on Loeffler's blood serum.

Sixth.—The presence of a dehiscence in the bony canal of the internal carotid artery, and the presence of a perforation through the walls of the carotid artery at the site of the dehiscence in the bone.

Seventh.—The occurrence of a severe hemorrhage from the internal carotid fourteen days after operation.

This case may not have been of otitic origin, but I believe it to have been. It seems reasonable to suppose that the dehiscence in the bone of the carotid canal allowed of an ero-

sion and infection of the walls of the artery, and that the abscess was the direct result.

One of the most constant localizing symptoms of frontal lobe abscess is hemiplegia. In the case under discussion this symptom was undoubtedly due to the extension of the subdural abscess over to the motor area. In some of the other cases reported, the hemiplegia was due either to the abscess involving the internal capsule, to the accompanying encephalitis which involved the internal capsule, or to pressure of the abscess upon the motor area.

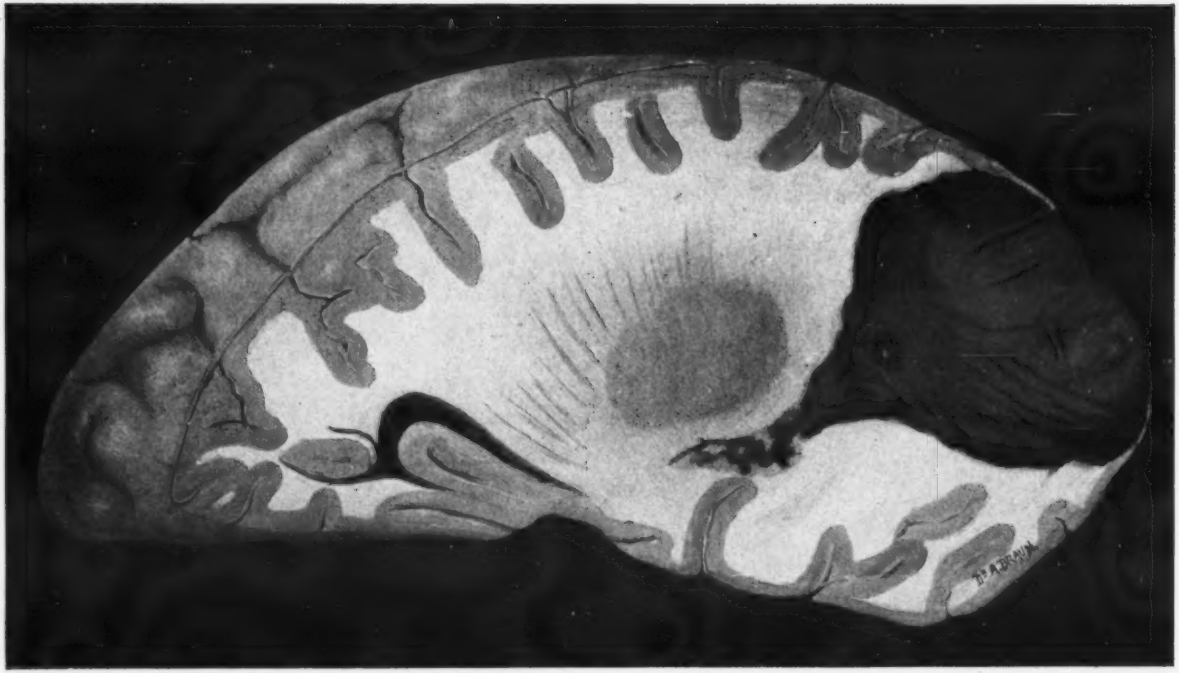

FIGURE I.

FIGURE II.

XXIV.

REPORT OF THE COMMITTEE APPOINTED TO CONSIDER THE BEST METHODS TO BE FOLLOWED IN THE TEACHING OF OTOLARYNGOLOGY IN UNDERGRADUATE AND POSTGRADUATE SCHOOLS.*

BY

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The subject assigned to our deliberation naturally divides itself into two distinct parts, and yet in the final analysis the postgraduate teaching is closely dependent upon the thoroughness of the undergraduate work.

FIRST.—"THE TEACHING OF OTOLARYNGOLOGY TO UNDERGRADUATES."

In order to ascertain what methods are followed and what views are held in the various leading universities of this continent upon this question, your committee submitted a series of questions to the professors of otolaryngology in forty of the leading institutions, the list of these being compiled from the Carnegie Foundation Bulletin No. 4, entitled "Medical Education in the United States and Canada."

These questions were as follows:

1. Should the "course of instruction" be extended over one or two years?
2. How many hours should be devoted to this "course of instruction"?
3. What proportion should be clinical and what didactic?
4. In what order should these be given?
5. What should be the limits of such a "course of instruction," having in view the necessities of the general practition-

*Adopted by the American Laryngological, Rhinological and Otological Society, May, 1913.

er, and the proper balance of the subjects of a medical curriculum?

6. Should "operations" form part of such a "course of instruction"?

7. Should a separate examination in otolaryngology form an integral part of the final examination?

N. B.—In answering the above questions, which are intended to ascertain the personal views of those responsible for otolaryngology in the leading medical colleges of the United States and Canada, it is desirable to indicate briefly also to what extent these personal views are carried out in the institutions with which the writer is connected.

Replies were obtained from some thirty-one institutions, including over twenty states and provinces, so that the opinions elicited may be considered fairly representative. In perusing these reports your committee was agreeably surprised to find so little divergence in either practice or opinion as the replies revealed, and have therefore the greater confidence in submitting the resolutions which form their conclusions.

We regret that we were unable to elicit satisfactory information as to the amount of "individual instruction" given to each student. Where the number in the classes are considerable (and if possible that number should never exceed six students), as Mygind[1] points out, "the student is apt to acquire superficiality in the examination of the patient." This fault is undoubtedly in many cases due to the teacher not having sufficient time to take each pupil individually and teach him all the details he should observe."

We note also that the idea still lingers in the minds of some of our leading instructors, that didactic lectures form an adequate means of instruction. About one-fourth of those reporting asked for equality between didactic and clinical instruction. Surely this cannot be right. The regions involved in otolaryngology are such as lend themselves least readily to demonstration by lectures, or even by lecture-clinics. It is only in so far as the student receives "individual instruction" on the living subject, that he can acquire an adequate knowledge of his subject in the limited time which can be spared in the overcrowded medical curriculum.

This "individual instruction" requires time, patience and competent assistants; but these are well worth the expense

involved, as by properly instructing the student of medicine in otolaryngology, we will do much to avoid the conditions which now lead to the foisting of vast numbers of what we may style pseudospecialists upon the public. To quote Mygind[2] again: "A few cases examined and followed thoroughly teach the student to observe, and give him better experience than a great number of cases examined superficially."

"Individual instruction," as pointed out above, demands competent assistant instructors, but the governing boards of our universities must be compelled to realize the absolute necessity which exists for the proper balancing of the medical curriculum, so as to turn out all around general practitioners, and must provide the equipment therefor.

Another point which your committee deem worthy of criticism in dealing with these reports is the scope of the instruction with regard to text books. Such a course should get as far away from the text book as possible. We cannot in the least agree with the gentleman who reported in answer to question five, "that the contents of the required text book on these subjects should be covered, *chiefly by recitations*." (Note the italics.) The student should be led to read up the cases he sees in one of the many excellent text books which are at his command, but to cover a text book by recitation is simply to waste time, and must lead to superficiality.

Every student of medicine has a right to be graduated primarily as a general practitioner. The first task of every general practitioner is diagnosis. No amount of text book recitation will develop the ability to diagnose correctly in otolaryngology, unless there go beforehand the visual knowledge of the normal as contrasted with the abnormal, the education of the eyes, ears and fingers. This education means actual work upon the patient, and the "course of instruction" should therefore be almost wholly clinical.

As regards the order in which instruction should be given, some of the teachers feel strongly that any didactic instruction should be given as the finale, to enable the student to coordinate his observations and place them in related groups.

By question five we hoped to elicit a sufficient answer to a difficult problem. With the daily advance of medical science, new subjects are with loud voices demanding admission

to an already overburdened course, and even in those universities where the course is one of five years, it is being found needful to relegate some of the science subjects to the preparatory course, so as to give the student time to digest what he sees daily in the wards. The best of judgment is therefore called for in determining what shall form a part of the minimum curriculum in medicine.

On the other hand, as Gradenigo[3] has pointed out, "What doctors need in their daily practice should be made compulsory, without expecting them to be familiar with complicated examinations and operations." This states in a nutshell what should be included in the "course of instruction" in otolaryngology. The student should therefore be made thoroughly familiar with the anatomy, be taught the use of the instruments of examination, be able to recognize the normal parts, be familiar with their appearance in the acute inflammations and in the commoner chronic affections, and finally be able to recognize and understand the principles of treatment of the acute affections.

With this information in his possession he will have a solid foundation upon which to build his superstructure, will be able to read his text book in connection with a given case intelligently, obtain a comprehensive knowledge of the condition of the various organs of his patient, and finally be in a position to secure early and useful assistance from the specialist. Inability to examine a larynx has often led to a failure to recognize malignant disease in its incipient stages, and many examples will occur to all of us where the lack of training of the student has been to the great suffering of his patient, and the disgrace of the practitioner. Such a course will, however, not be complete without instruction from his professor as to what symptoms demand the skill of the specialist, and the unwisdom and criminality of failure to refer the case for examination by the thoroughly trained specialist when such symptoms arise.

The question regarding operations was intended to raise the point that except where emergency aid is required, as in myringotomy, intubation, and tracheotomy, the general practitioner should not undertake even the removal of tonsils, because every operative procedure in otolaryngology is attended by risks which call for special training and special

skill. The student has a right, however, to understand the way in which the condition of the patient may be improved by skilled operative procedure.

The last question elicited practically unanimous replies that a separate examination conducted by the professor of otolaryngology should form an integral part of the final examination. The association of a question or two on the ear, or throat, upon the paper in surgery must be relegated to the past.

Your committee therefore beg to recommend for your adoption the following as the minimum requirements of the undergraduate course in otolaryngology:

First.—That each student of medicine is entitled to receive sufficient instruction in otolaryngology to enable him to deal with the parts concerned as intelligently as with the rest of the human body.

Second.—That for this purpose he should be familiar with the anatomy of the parts, possess a practical working knowledge of the simpler instruments of examination, be able to recognize familiarly the normal appearance of the structures, be practically acquainted with the pictures presented by the acute inflammations, and the commoner diseases of the organs involved, and how to treat the same. He should further be instructed to recognize the symptoms of serious complications, the wisdom of early associating the greater knowledge of the specialist in the care of his patient, and the dangers associated with all operations upon the parts involved, except in the hands of the competently trained specialist.

Third.—That for this "course of instruction" a share of each of the two final years of the medical curriculum is essential.

Fourth.—That the said "course of instruction" should embrace both clinical and didactic teaching, preferably intermingled, the clinical to be greatly in excess of the didactic, at least in the proportion of three to one.

Fifth.—That clinical instruction should be given to small groups of students, preferably in classes of six, each receiving individual instruction, and this together with the didactic work should extend over a period of at least forty hours in the time of student in each of the two years.

Sixth.—That operations should not form any part of the

above course, except that in so far as may be possible, each student should be permitted to assist at the performance of the simpler varieties, that he may become practically acquainted with the methods of procedure and the objects sought.

Seventh.—That a special separate examination in otolaryngology, preferably clinical, conducted by the professor of otolaryngology, should form part of the final examination in medicine of every university and every licensing body.

Eighth.—That a copy of these resolutions be forwarded to the medical faculty of every university and college of medicine, as well as to every state or provincial examining board in the United States and Canada.

SECOND.—THE TEACHING OF OTOLARYNGOLOGY TO POST-GRADUATES.

The second part of our report concerns postgraduate instructions in otolaryngology, and while the former was aimed at the production of the well rounded general practitioner, this must endeavor to achieve the evolution of the scientific specialist.

The subject is much to the fore on this continent and elsewhere. Last year the *Journal of Laryngology, Rhinology and Otology* published an able series of articles upon the education of the specialist in throat, nose, and ear disease, in Denmark, Germany, Italy, Austro-Hungary, and France. In Britain, it formed a topic of general discussion at the Liverpool meeting of the British Medical Association. On this continent it has led to the publication of recent papers by Shambaugh,[4] Ellett,[5] Cragin[6] and others, and formed the basis of an interesting discussion before this society two years ago, a discussion which led to the formation of the committee now reporting. A pronouncement by this important organization will therefore be quite apropos at this serious juncture, for we must not forget that with privilege comes responsibility, and this society, whose membership is so extensive and whose influence so widespread, should, noblesse oblige, lead, not follow, in the making of an intelligent public opinion.

In opening the discussion of the question before the British Medical Association, Mygind[7] of Copenhagen stated that "Although there is no regular system of education of the spe-

cialist in otolaryngology in Germany or Austria, we may divide the practical education into three stages, through which the specialist generally passes, both in these two countries and in most other continental countries.

1.—The first stage: The preliminary education which each student received at the university. It is compulsory in most continental countries and extends over a period of one term.

2.—The second stage is represented by the education which many future specialists receive, after having left the university, at one of the numerous postgraduate courses which nearly every university and many hospitals offer, and which are given either by professors or by private docents attached to the university. In Austria they are, according to Frey, divided into six different kinds: (a) Clinical diagnosis and treatment; (b) functional tests; (c) bedside work; (d) surgical practice on the cadaver; (e) practical treatment and minor operations in out-patient department; (f) demonstrations and lectures on normal and pathologic anatomy, histology, and physiology, to which quite lately has been added (g) pathology and diagnosis of labyrinthine diseases.

3.—The third stage is the education the future specialist receives as assistant at a special clinic attached generally to a university or a general hospital.

The third stage is undoubtedly the backbone of the whole education of the specialist, and it is only a rare exception that a medical man on the continent nowadays is universally recognized as a specialist without having been for some time assistant at a public clinic. In Germany and Austria, and also in some other continental countries, so much stress is laid upon this part of the education that one often meets specialists of a considerable scientific reputation remaining for a considerable number of years assistants at a special clinic, in order to stand a good chance when a chair in otolaryngology is vacant at a university. After having been appointed an assistant for a considerable period at a special clinic, and after having given proofs of scientific ability—in Germany an officially approved dissertation must be printed—the specialist may have in Germany, Austria, and Italy the title of privat docent conferred upon him by the university.

This gives him the right of teaching in the university and enrolls him in that high but by no means numerous class of specialists from whom the professors are chosen."

Up to the present on this continent there is no recognized portal to the specialty. On the other hand, the gates may be said to be many, and yet, "mirabile dictu," our towns and villages and even our cities are filled with "specialists" who have entered by no gate whatever, but have simply "climbed over the wall," and are to some extent, at least, to be considered merely as "thieves and robbers."

The house surgeon attached for three months to the otolaryngologic service of a hospital, the general practitioner who derives his knowledge of the subject from a six weeks' course in a postgraduate school, and the man who takes a run in Europe immediately after graduation, alike think themselves worthy to be ranked as specialists.

As long ago as 1892, Osler[8] pointed out that there is "serious danger in the attempt to manufacture rapidly a highly complex structure from ill seasoned material."

As Shambaugh says,[9] "there is a deplorable lack of proper standards in medical education, and the specialties of the eye, ear, nose, and throat have had to carry a disproportionate share of these ill trained practitioners."

Again, as Amberg so clearly puts it, "From the standpoint of a well regulated and governed community, it represents anarchy, and anarchy is the absence of government, the state of society in which there is no supreme power."

It is time we had done with this farcical sort of preparation, if our specialty, worthy as it is of the best, is not to be dragged in the mire as a result of the ignorance of anatomy, diagnosis, and technic displayed by a very large proportion of the rank and file of those who now style themselves "specialists in diseases of the ear, nose and throat."

We all know the facts, and we deplore them. Now, what can be done to face and overcome the difficulties of the situation? We must first decide what constitutes the standard of proper training, then provide for its acquirement, and finally bring such influence to bear upon state legislatures as to secure the legal enactment that only specialists provided with this training may practice as such.

Those who have written upon this subject are agreed that not less than two years should be devoted to preparation for practice as a specialist. This should, however, be preceded by one or more years spent in general practice; or better, as

house man in the medical and surgical services of a good hospital, at least half the time being devoted to surgery. The specialist course itself must embrace highly specialized studies in the anatomy, physiology, embryology, pathology, physics, and therapeutics, which bear upon the subject, operation on the cadaver, etc.

The time required for this course will occupy at least six months. In addition the candidate must subsequently serve as a resident assistant in a special hospital or in a similar position in the special service of a large general hospital, for a period of not less than eighteen months, and to provide sufficiency of experience, the special clinic should work daily, and should have at least fifteen beds assigned to its use. In this connection it is well to insist that during the last six months of his service the candidate shall act as a senior assistant in the major operations and personally perform those less important.

Where shall such training be provided? Without doubt the scientific part must be placed solely under the control of the universities, for these are the proper bodies to provide postgraduate instruction. In as much as the universities are amenable to the public opinion of such bodies as our own, and as they stand for increasingly higher ideals, there is a guarantee that the instruction provided would be thoroughly scientific and comprehensive.

Not every university could at present undertake such postgraduate instruction, but a few judiciously selected centers could be found even now, where such courses as we suggest could be given.

With regard to the hospital training of the candidates we are not so limited. Several first-class special hospitals exist whose housemen are in demand by institutions which cannot now train their specialist juniors.

The terms of service in these special hospitals are, so far as we know, never less than eighteen months.

In the special services of the larger general hospitals it is becoming increasingly common for the house surgeon in otolaryngology to be obliged to serve for eighteen months, to confine himself to these subjects only, and to be selected from applicants who have been several years out of college and who have decided to devote their future to otolaryngology.

It would not be difficult to draw up a schedule of the requirements which such institutions must fulfill, if their certificates of services rendered are to count in the qualifying of candidates.

It would not be necessary to confine the candidate to such positions as he could find on this continent, and in any event there might easily be arranged provision for the candidate pursuing further study in Europe.

To add a fitting coping stone to the structure whose erection we are considering, the candidate should finally be compelled to present himself to one of the universities supplying the postgraduate instruction indicated above for examination on the work embraced in the entire course, and the successful candidate should be given a degree—that of Ph. D. (otolaryngology), has been suggested in several quarters.

In sketching the above course we have drawn nothing fanciful, for at the present time every man who is desirous of placing himself at the top of the ladder in our specialty, in one way or another pursues such a course of study, but often finds with regret that he has not been wisely advised in his choice of work, and places to work in, and there is no arrangement for the examination anywhere, except that indicated in the above quotation from Mygind, viz., in Germany.

The final step, that of securing legislative measures, would of necessity be difficult to attain, but public opinion will ere long demand that we be protected from the incompetent specialist as we are now from the ill trained dentist.

The program sketched above takes no account of the postgraduate school as at present organized, nor need it do so. The case against the present condition in postgraduate teaching has been ably stated by Birkett,[10] and need not be repeated here.

By no reconstruction which we know could we hope to secure any control of institutions which are simply, after all, incorporated for the purpose of dividends. They came into existence to fill a need produced by the poor character of the instruction in general medicine given by many of the schools of medicine, many of which were themselves proprietary, and, as Shambaugh has already said, "when the undergraduate instruction in medicine has been thoroughly done, the elementary work in the specialties will not require the subsequent

patching, which is all that the existing postgraduate schools are prepared to do." The Carnegie Report has already effected a marvelous change through the public opinion its revelations have aroused and the proprietary school is doomed.

With regard to postgraduate teaching in otolaryngology, your committee beg to recommend—

First.—That the time has arrived to standardize the degree of scientific attainment and of clinical training which shall qualify those who wish to begin the practice of otolaryngology as a specialty.

Second.—That the report of this committee now submitted forms a suitable basis for such standardization.

Third.—That a committee representing this society be appointed to work out the details.

Fourth.—That the other associations of otolaryngologists on this continent, viz,., The American Medical Association, The Academy of Ophthalmology, Laryngology and Rhinology, The American Laryngological Society, The American Otological Society, be and are hereby invited to appoint representatives to act with the above committee from this society, so that the action finally taken shall represent to the fullest extent the consensus of opinion of American and Canadian otolaryngology.

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XXV.

SUSPENSION LARYNGOSCOPY WITH DEMONSTRATION OF METHOD.*

By Wolff Freudenthal, M. D.,

New York.

It is not so long ago that we thought inspection of the air passages was a closed chapter and that nothing more was to be accomplished in that direction. Then Killian introduced bronchoscopy, and this was followed by other new ideas. I need only mention the names of Mosher, Jackson, von Gyorgyai, Hays, Yankauer, Beck, and Edgar Holmes of Boston, to bring to your minds a great deal that has been done of late. But laryngology is advancing rapidly, and today again we have something entirely new, i. e., suspension laryngoscopy.

This latest discovery of Killian's is not only very interesting, but his method is of great practical value in many cases, and it has been tried by the writer in a series of experiments which have extended over nine months. In the first publication† on suspension laryngoscopy, its advantages and shortcomings were defined, and after larger experience we hold practically the same views.

It is unnecessary to describe the method just demonstrated in detail, as you have seen it today and can find the full account in the publication mentioned. Permit me, however, to give some additional points which may prove useful.

Besides the necessary instruments, the first thing required is good illumination. The best for operative work, and the only kind advisable, is a good Kirstein headlight. For other work, a small lamp (or two) attached sideways may be helpful. The second requisite is a room that can be darkened

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*Read before the nineteenth annual meeting of the American Laryngological, Rhinological and Otological Society, held at Washington, D. C., May 8, 9, 10, 1913.

†Wolff Freudenthal: Personal Observations with Suspension Laryngoscopy. Medical Record, February 22, 1913.

(absolute darkness is unnecessary); and the third, an assistant with some experience in handling the apparatus. Trivial as these things seem to be, they are very important. The writer speaks from experience. Once, on being called to a general hospital to remove a growth from the larynx, a total failure resulted, owing to the lack of proper facilities. At another time the assistant was entirely at fault, as he manipulated the handle so roughly that he irritated the patient, who was of a very nervous temperament, and nothing could be accomplished under local anesthesia.

Only once a slight accident occurred, which I should like to mention: M. S., a short, rather heavy-set young man, twenty-five years of age, was curetted under suspension laryngoscopy on account of an ulceration of the posterior laryngeal wall (incipient tuberculosis of the lungs). The procedure took the usual course, but immediately after the operation the whole appearance of his face changed; it became swollen, highly red, and the whole forehead was bloodshot. He suffered no discomfort, however, and I ordered simple rest and codein. The next day there was not much change. In the pharynx there were still enlarged arteries on the right lateral wall and on the left tonsil. A few days later everything appeared perfectly normal.

Another point to be mentioned relates to the epiglottis. Years ago, when Kirstein first described his instruments for autoscopy, I noticed that the epiglottis in many instances could not be kept down with his spatula. At that time an attempt was made by me to overcome this difficulty by means of hooks which could be pushed over the epiglottis, these being made by Tiemann & Company. Later, however, this plan was forgotten, to be recalled only when the necessity for holding up the epiglottis again presented itself. The writer then resorted to the same device (see Figure), which consists of a silver wire fastened in the groove of the spatula at B and C, and ending in two thickened points, D and E. These can be pushed forward, and when they are in that position the epiglottis will remain in situ. By means of the hook A we can bring the wire forward or backward. The portion A—B can be turned to one side, if it is in the way. In the cases so far examined, this modification has worked very well. Since writing this I have noticed that Albrecht of Berlin had a

similar idea, and published his modification of a tongue holder in the *Berlin. klin. Wochensch.*, p. 2092, 1912. I have not seen his instrument, as it could not be obtained in New York.

Permit me to give you the details of some of the cases handled by me, which may be divided into several classes.

I.—TUBERCULOUS CASES.

These have been the most instructive, but only those will be mentioned which were of special interest to me.

G. H., a sailor, aged 40, was referred to me in September, 1912, on account of hoarseness which had come on gradually during the last ten weeks. No pain, no cough, but a heavy feeling in his chest.

The larynx showed an irregular infiltration of the left vocal

Epiglottis Holder.

cord and a thickening of the entire right one, which was immovable. Quite a large ulceration was seen on the posterior wall. Examination of the chest revealed only the presence of a bronchitis; no tubercle bacilli. In spite of the fact that the lungs showed no positive evidence of any tuberculous affection, I took the case to be one of tuberculosis.

On October 18th, several pieces from the vocal cord were removed, and the ulcerated surface was curetted under suspension laryngoscopy. The immediate result was satisfactory. The ulcer healed and patient could breathe easier. Within a week he left for a country place. At the beginning of December, 1912, he returned, as he did not feel comfortable. On

December 9th, the septum for the first time showed the presence of a few tubercle bacilli. There were some new ulcerations, which were treated with orthoform emulsion. The pain disappeared, but not the ulcers. These were curetted again under suspension on the 20th of December, and again the patient felt so much better that he left for the mountains.

In February, 1913, he returned to the city with some dyspnea. Sputum positive, but chest findings almost the same as in the beginning. The larynx, however, had changed surprisingly. There were irregular masses springing up from both vocal cords; the arytenoids were markedly swollen, so that very little of the posterior wall was visible, and little space was left for breathing. Patient did not care to undergo another operation, and was kept under observation, the dyspnea growing steadily worse.

March 17th.—The dyspnea was so marked that I came very near doing a tracheotomy in my office, but finally succeeded in getting him to the hospital. There I removed five large pieces from the larynx under suspension laryngoscopy, local anesthesia being employed. The bleeding during and after the operation was minimal, in spite of very extensive removal of tissue. I mention this merely on account of a remark made by Dr. Schoetz in the Berlin Laryngological Society. (Of course, this does not mean that the possibility of hemorrhage in tuberculosis of the larynx is excluded entirely, but only that we need not be afraid to operate on such cases.)

The further history of the case proved that we were right in our deductions. After the operation the patient was put to bed and given ice externally and by mouth. All the instruments required for a tracheotomy were placed next to his bed, in case of immediate necessity. His breathing was better than before the operation, but about six hours later it again became quite bad, due, undoubtedly, to edema of the larynx, which, however, subsided gradually. The next day, when I examined him, a good deal of edema was still present, as well as some dyspnea and dysphagia. The day following (March 19th) the picture had changed much for the better. The edema had largely subsided, he could breathe almost naturally, and felt entirely different. The dysphagia, however, was marked. Orthoform emulsion was applied.

March 24th.—No appetite. Patient felt like vomiting all

the time. There was a false membrane in the larynx and a great deal of discharge from that source. Respiration free.

March 27th.—Fulguration was applied to hasten the process of healing, with the result that the edema again appeared next day, together with dyspnea. This subsided after application of cocain and adrenalin, but soon recurred. Examination showed a dislocation of the left arytenoid, which was flattened and lower than the right one.

The dyspnea became so marked that on March 31st I removed part of the overhanging tissue from the right vocal cord, in the presence of Dr. Layman of Indianapolis and other colleagues. After that the breathing remained free, and about two weeks later the patient again left the city.

In reviewing the history of this remarkable case, you will find several points of interest. First: The case presented the clinical picture of advanced laryngeal tuberculosis at a time when the lungs were very little or not at all involved. Second: After we had once curetted the larynx, infiltrations sprang up so rapidly that tracheotomy became imminent. But I refrained from that operation and instead removed five large masses from the larynx. I did not know that one could with impunity resort to such an extensive excision until in this case I was simply forced to do so in order to remove as far as possible all diseased tissue, and also to give breathing space.

You will naturally ask why tracheotomy was not done, which is so much simpler. To this I must answer that I was ready to perform this operation in the hospital whenever it should become necessary, but I tried to avoid it if possible. What would be gained by it in such a case? Only the danger of immediate suffocation would be averted; but afterward, what then? We would have had to resort either to a laryngofissure —and the mortality of that operation is very high indeed— or remove the enormous masses later with the aid of suspension laryngoscopy, and that probably would have been more difficult with the trachea opened. So, after careful deliberation, it was thought best to proceed as we did. The patient has gained free breathing space without having to undergo a tracheotomy, with the eventual necessity of having to wear a tube for a long period. He has now every chance for improvement.

Another case which is remarkable for the ease by which

a cure was accomplished is that of a tailor, aged 30. He had suffered from tuberculosis for the last three years. He had been for about a year in Denver, Colorado, where his pulmonary condition was practically arrested. He looked well and strong, and the only thing that annoyed him was the larynx. On account of his hoarseness he could not get a position, and the irritation in his throat made him cough. Quite a good-sized interarytenoid growth was visible, which was apparently the sole cause of his trouble. In several clinics attempts at removal had been made, but they were unsuccessful. The writer had the same experience at his first attempt. When the patient was placed under suspension laryngoscopy, quite a large piece was removed, but afterwards we found that a good deal more had been left and we had to operate twice again, the last time in the presence of Dr. J. Solis-Cohen of Philadelphia, on April 16, 1913. The patient felt much better and soon withdrew from treatment. I believe him to be cured.

It must be added here that as a rule large masses of tissue are not removed at one sitting, as we do not keep such patients in the hospital overnight and edema of the larynx is apt to set in. It is only where there is no danger that we remove all that is necessary at once, even very large masses.

Whether this case and the one previously referred to remained cured or not, is immaterial so far as the method is concerned. For the time being the first patient's life has been saved, and the last patient's growth removed, thus giving them the best chances for recovery.

In this connection I may be permitted to give the further history of two cases reported before.

Mrs. Z., a very nervous and excitable woman, was suffering from tuberculosis of the lungs and ulcerations of the epiglottis and left vocal cord. She was curetted on November 8, 1912, as thoroughly as possible. The dysphagia disappeared to a great extent afterwards, and if it were not for the pain from the ulceration of the epiglottis—that could not be reached—she would have felt much better.

On February 16, 1913, the following note was made in my book: Patient had been treated for several weeks after the curettage according to the usual methods, and now she can eat and swallow like any healthy person. She had not come for treatment for the last four weeks, and now has pain in the chest—slight pleurisy.

March 12, 1913.—Status idem. She only came to ask whether she should take the serum treatment so much talked about. Larynx in good condition.

April 15, 1913.—She again has dysphagia, is unable to come to my office, and is being treated by a local physician. There is no doubt in my mind that the ulcerations have recurred and that she ought to be curetted again thoroughly under suspension laryngoscopy.

M. F. had suffered from tuberculosis for about eight years and had a large mass of tuberculous infiltration, with an ulceration on the posterior wall of the larynx. Both arytenoids seemed enlarged (perichondritis). He had been seen by many colleagues of this city. The writer also had had him under treatment for quite a time, but it was impossible to get rid of the infiltrations. Even fulguration did not exert any beneficial effect, as it was not well tolerated by the patient. Since his pulmonary condition did not bother him, he was naturally desirous of having his throat cured. On November 15, 1912, in the presence of a number of laryngologists who attended the Clinical Congress of Surgeons, quite a large piece was removed from the larynx. Part of the arytenoid had been caught and removed at the same time, but not the entire mass of granulations. Postoperative pain was very slight; no dyspnea. A false membrane soon formed over the site of operation, but soon disappeared. On December 20, 1912, the whole mass was curetted thoroughly, with very satisfactory result.

On February 2nd he had to be curetted again, and what followed in this instance was similar to the condition observed in the case reported by Halle to the Berlin Laryngological Society (*Berlin. klin. Woch.*, p. 321, 1913), viz., the picture of a paralysis of both postici muscles. It is evident that no paralysis of central origin was present, but that by the curettage of the posterior laryngeal wall scars had formed which brought the vocal cords in adductor position. Yet he has no dyspnea and feels quite comfortable, so that no other treatment is indicated.

It seems to us that through suspension laryngoscopy an extensive field has been opened for thorough and radical work in laryngeal tuberculosis. We are thus enabled to curette all ulcerations thoroughly, with the exception of those of the epiglottis, and we are furthermore in a position to remove the

diseased tissues down to the healthy parts. This, for the first time, seems like real surgery of the larynx. How far we may go, the future will have to show us.

II.—ABSCESS FORMATIONS.

As mentioned very briefly in my first article, these cases offer a great opportunity for suspension laryngoscopy, especially those of abscess in the larynx. A case that occurred in my practice several years ago is still fresh in my memory. A young woman who had a retropharyngeal abscess suddenly developed severe dyspnea, the phlegmon having extended into the larynx. Both arytenoids were seen to be much swollen, apparently occluding the entire lumen of the larynx. One arytenoid was incised and a good deal of pus was evacuated. When the other was incised, the patient suddenly collapsed and fell to the floor. A hurried tracheotomy saved her life for twenty-four hours. How much better would it have been to have such a patient under suspension laryngoscopy, with the head hanging down and the abscess draining downward by its own gravity. These cases are quite rare, but if ever there was a strict indication for a certain method, it is in such patients.

While writing this article I happened to see another case, the history of which may be of interest. A married woman, aged 27, was referred to me on February 22d, on account of hoarseness which had persisted for six months and was gradually getting worse. She had a slight cough, but no other complaint whatsoever. I made a diagnosis of pachydermia laryngis, and treated her accordingly. Later on she suffered from tonsillitis, both tonsils being very much swollen, and it turned out that she had had such attacks before and that she was subject to rheumatism. It was decided to enucleate the tonsils some time after the acute attack was over. But no sooner had the condition of the tonsils improved than a swelling of the left arytenoid set in. This was considered as a purely rheumatic arthritis. In spite of all medication, the discomfort (dysphagia and slight dyspnea) was very annoying. Three days later the other arytenoid cartilage became swollen, though to a lesser degree, and at the same time true blebs appeared on top of the left arytenoid. As the dyspnea had increased, it was naturally thought advisable to open the bleb.

Remembering my former experience in that direction, I put the patient under suspension laryngoscopy, and at once saw not only the bleb on the left side, but also another on the right side, just below the glottis, which I had not noticed before. Both were incised, and patient felt easier. A very energetic antirheumatic treatment reduced both arytenoids materially, and she left the hospital without dyspnea. (There was no pemphigus present.)

Even in abscess formation higher up in the pharynx, suspension laryngoscopy is occasionally indispensable, and perhaps may be universally adopted in the near future. Already some of our laryngologists no longer open a retropharyngeal abscess in young children in the upright position, but prefer to do it with the head hanging down. Accidents have happened in their clinics, and they have learned to be careful.

One case occurred not long ago which may be worth mentioning. A house surgeon in one of the larger hospitals of this city called up his visiting surgeon during the night, asking his permission to open a retropharyngeal abscess in a young child. Consent was readily given. Some time later the visiting surgeon was called up again and asked what should be done with the child, as it had not been breathing for the last forty-five minutes! (Tracheotomy had been done!) Undoubtedly there are more observations of such fatal results, which always occur from the pus clogging up the glottis. How different is the procedure under the suspension method. We had a chance of operating on two such cases in infants of sixteen and nineteen months respectively. In both instances the abscess was rather deep down, but showed up beautifully as soon as the child was under suspension. The whole extent of the abscess was easily seen and still more easily evacuated. The children had received only a few whiffs of ether.

This brings us to the question of

III.—TONSILLECTOMY.

Shall they all be done under suspension when general anesthesia is employed? While the writer is not prepared to give a definite answer to this question, it is his experience that in older children the operation can be done easily in this position, and in many cases it is preferable to the prone or the upright posture. In younger children,—that is, below the

age of three or four years,—the mouth cannot be opened sufficiently wide to allow the use of the comparatively big tonsil instruments with ease and satisfaction. In older children it is simple.

If you do operate in that way, it is wise to introduce the spatula sideways and so fix it that its end is not in the median line, but points toward the tonsil to be operated on. In this way, the tongue is kept entirely out of the way. If narcosis is carried out satisfactorily, the advantages of this mode of operating on the tonsils are in many cases very noticeable. The writer has operated on about twenty children in this manner, and finds that the benefits derived are due to the fact that the blood flows downward into the nasopharynx and gets out of the way. We do not require any suction apparatus, and can finish the operation quickly and without much assistance, always provided that the anesthesia is complete.

IV.—PAPILLOMA OF THE LARYNX IN CHILDREN.

It would seem that these cases are especially adapted to suspension laryngoscopy, but the writer has not had the good fortune to come across such a case for the past year. He has seen, however, a number of

V.—BENIGN NEOPLASMS OF THE LARYNX IN ADULTS.

These patients were absolutely unmanageable under cocain, and the suspension had to be done under general anesthesia. The first requisite in these cases is perfect anesthesia, and you are lost without that.

The following case, upon which I operated in conjunction with Dr. J. Weinstein, may be of interest:

S. E., aged 52, agent. Hoarse for the past three years. The doctor had several times removed pieces from a mass on the left vocal cord, which were always found to be benign. For the last two months patient had had some dyspnea, and the larynx showed a large mass filling nearly the entire left side. As there was no strict indication for removal of the entire larynx, we took out as much of the diseased tissue as we could get. This was done under general anesthesia. The patient had quite a little edema of the larynx following the operation, as well as dyspnea, but these disappeared, and I understand that he is now doing well. Examination of the tissues removed again proved to be benign in character.

In cases where it is necessary to operate on the anterior commissure, which is naturally the hardest to reach, the epiglottis has to be out of the way entirely. For that purpose it may be sufficient in some cases to use a longer spatula or the writer's spatula with the hooks, described above. If neither of these proves adequate to bring the anterior commissure into view, as will be the case in the majority of instances, then one assistant has to press down the larynx from the outside. This helps in many cases.

Dr. J. Solis-Cohen of Philadelphia recently suggested that with a long, flexible-handled, polished steel mirror, one centimeter in diameter, one could examine and operate upon the anterior walls of the larynx and trachea under suspension laryngoscopic examination. As I had in my possession a long-handled glass mirror which had been devised for the inspection of the vocal cords from below, I straightened it and tried Dr. Cohen's suggestion. I was able to see the anterior portion of the larynx, but it is doubtful whether another instrument to remove any neoplasm could be introduced simultaneously with the mirror. Yet this is a very interesting experiment and encourages future trial.

VI.—FOREIGN BODIES IN THE PHARYNX AND LARYNX.

Dr. E. D. Davis of London removed a pin from the posterior pharyngeal wall of an infant eleven months old, under chloroform. He found the great advantage of suspension to be in the comprehensive view obtained by this method, as compared with the small area visible by the esophagoscope (*Brit. Med. Jour.*, January 18, 1913, p. 115). The operation was apparently very easy.

It seems to us quite natural that foreign bodies in the larynx should be removed under suspension laryngoscopy, and that we ought to be able to reach them very easily without the least risk.

In conclusion, I would say that while suspension laryngoscopy is not going to revolutionize the entire domain of laryngology, nor replace the old established methods in the large majority of cases, it will be—if it is not already—of great benefit, both diagnostically and therapeutically. In the many cases where through its aid a clear view of the operative field is gained, it has proved of incomparable value.

XXVI.

THE TRAINING OF THE SPECIALIST.*

By Thos. J. Harris, M. D.,

New York.

The last half of the nineteenth century witnessed a marvelous transformation in all walks of business. New methods and new means, inspired by such master minds as that of Morgan, were in evidence on every side. This development and expansion were not limited to business alone. They were equally apparent in every department of science. It was said of Goethe that his was the last great mind able to grasp all knowledge and all literature. In this wonderful advance medicine has borne a conspicuous part. There was a time when a physician could hope to master the entire realm of medicine. This has all changed, and this change has largely taken place within the last fifty years. Most, if not all, of this progress, embracing discoveries which have revolutionized the conception and treatment of disease, is due to those who in the truest and broadest sense were specialists. Specialism in medicine and specialists have come to stay, like it or not as we may.

Among the earliest, if not the earliest, to attain to the dignity of being a specialty, was that of laryngology. Horace Greene, denounced and condemned by his contemporaries, may be properly considered one of the first specialists in laryngology in this country. His active work was done only a little over fifty years ago. This Association was founded in the year 1878 and embraced on the roll of its founders almost the entire number of those who were devoting themselves at that time to the specialty of laryngology in America. Consider the marvelous expansion since that day, both in the number of specialties and in the number of men, properly or improperly, announcing themselves as specialists in laryn-

*Read at the thirty-fifth annual meeting of the American Laryngological Association, Washington, D. C., May 7th, 1913.

gology. The Seventeenth International Congress of Medicine, to be held in London this coming Auugst, announces twenty-three sections or departments in medicine. In place of the little group of twenty or thirty men in 1878, if we are to take the estimates given by competent authorities, there are in this country today alone, several thousand men described as laryngologists. In the state of New York a list has recently been compiled numbering several hundred.

A perusal of the early volumes of the Transactions of this Association will show the magnificent work that was done by the laryngologists of thirty-five years ago. The specialty, however, has extraordinarily developed, and today it means vastly more than it did at the time of the establishment of this Association. No longer is it confined to the treatment of diseases of the larynx. The closely associated and all important field of rhinology has been discovered, and demands equal or even more careful consideration; and while not actually a part, in practice otology, too, has become so wedded to laryngology that it is usually considered to belong to "greater laryngology." Bacteriology, with all that it means, has been born since the early days of laryngology, as well as the important field of bronchoscopy.

This rapid expansion and the increasing numbers of those who are announcing themselves as specialists raise a most serious question and one which is deserving the careful consideration of this Association. It is, what preparation or education is required in order to become properly equipped for the specialty? Already it has been the subject of an interesting discussion before the American Laryngological, Rhinological and Otological Society, and last year it was considered at the Liverpool meeting of the British Medical Association. As Shambaugh rightly points out, a proper training should give a man the ability to do not merely routine, but original work, something that we in this country have been sadly lacking in.

It cannot be emphasized too strongly that the clinical side is only one side of a specialty. It has been my privilege for many years to be engaged in postgraduate instruction, and I have had in this way an opportunity of meeting many men who are proposing to specialize. More and more I am impressed with the inadequacy of the preparation that the great

majority make. The six weeks' specialist has been a constant reproach to postgraduate schools. This, however, is not altogether the fault of the school. The postgraduate school is only responding to the demand of the practitioner. If we are creditably informed, many a small town in the middle west possesses no less than five or ten "nose and throat specialists." Where they acquired their specialty is an unknown quantity. As Wishart, in a communication later to be referred to, very forcibly states, "Up to the present, on this continent, there is no recognized portal to the pursuit of the specialty. On the other hand, the gates may be said to be many, and yet, mirabile dictu, our towns and villages, and even our cities, are filled with "specialists" who have entered by no gate whatever, but have simply 'climbed over the wall,' and, to some extent at least, are to be considered merely as thieves and robbers."

The basis of all medicine is anatomy and pathology. This seems to be lost sight of by the man who too often appears to choose the specialty of laryngology because it is an easy way of practicing medicine and making money. Only recently in Vienna, we were told of an American who went there to get an opportunity to do a series of submucous resections, and who publicly asserted that that was all that he had come for, and that he had no wish or desire to acquaint himself with the anatomy or pathology of the subject. Only second in importance is a thorough training in general surgery. Our specialty has become to a large degree surgical, and we are called upon, as our predecessors never were, to perform all sorts of major operations. This demands a thorou grounding in every phase of surgery. Of general medicine and its profound bearing upon our specialty, it is unnecessary to speak.

Only after the young man has been thoroughly grounded, then, in anatomy, pathology, surgery, and medicine, is he prepared to take up the clinical side of laryngology. This preparation cannot be made in a month or a year. To our mind, it demands at least two years—and, better, three. We recognize, of course, the objection that will be raised in regard to the time required. This can be probably reduced to a considerable degree by a more thorough preparation in the undergraduate school, although the kind of training which we

have in mind can never be entirely acquired by the student who is studying for a degree and who must prepare himself upon a number of subjects. What are the usual methods of preparation for special work at present? They are, first, learning the specialty in the course of a general practice, with or without connection with a special clinic. This is the method that many of the beginners in our specialty were compelled to pursue, and it continues to be the method pursued by many men who, in a natural way, graduate little by little out of general practice into some specialty. Usually the physician who is doing this is so occupied by the demands of his general practice that he can devote only a little time, and that with much irregularity, two or three times a week, to the clinic, gaining some instruction from his chief, but compelled to learn for the most part by himself. The objections to this method are manifest. It can never give a broad training, although it is bound to produce what is of inestimable value, a man well fitted by years of experience for special study.

The second method is by taking postgraduate courses here or abroad. There has been a marked advance in the method of instruction in our postgraduate schools in recent years. A student can get excellent short courses in every department of laryngology, as well as opportunity to work in the various clinics as long as he may desire. To our mind the value of the postgraduate medical schools cannot be overestimated. They have been and are doing a tremendous good for the physician. Their chief mission, in our judgment, however, is to the man in general practice who desires to brush up in order to do his work more efficiently. The four or six weeks' course should be entirely done away with, except for specialists who desire to do advanced work, and no beginner should be received for a period of less than six months, or, better still, a year, and then only after he has had the necessary groundwork in anatomy, pathology and surgery just referred to. This should take the form of connection with a laboratory and a surgical clinic, each for a period of at least a year.

Third, residence as interne or assistant in a special hospital. This offers, as far as the clinical side of the training is concerned, undoubtedly the best opportunities of acquiring the specialty. A young man who has gone through one of our

special hospitals in this country or in Europe, residing there from one to two years, will undoubtedly come out well trained from the clinical standpoint. Such opportunities are, however, comparatively few, and even in those who have enjoyed them there is usually a sad lack of preparation in the groundwork to which we have just referred, and which is so essential for a thorough training.

That this question of education in medical specialties is receiving the consideration of the profession is evidenced by the action taken at the recent Clinical Congress of Surgeons held in New York last fall, in regard to the establishment of a postgraduate surgical degree. If this is true of the surgeon, is it not equally true of the man working in other departments of medicine? Dr. Wendell Reber, of Philadelphia, in a paper read before the Pennsylvania State Medical Association last year, on the teaching of ophthalmology in America, has advocated the giving of a degree in ophthalmology to men who have successfully carried out a required course of instruction. He believes that there should be some agreement between the fourteen postgraduate medical institutions in this country "as to the minimum training required of applicants for examination, and some approach to uniformity in the ordering of a three and a six months' course." We would, as we have said, favor a decidedly longer time than three months. "He recommends that no applicant for postgraduate teaching should be admitted to any of the well-recognized specialty courses who has not completed three years in general practice or its equivalent in general hospital work. If this idea should be carried out in connection with all the specialties in medicine, we would have in a few years a highly trained body of men to whom the public would turn as the men best qualified by education and experience to carry on their work." (Quoted from *The Medical Times.*)

To these views, in the main, we heartily subscribe. What we desire is quality in those entering our specialty, not quantity. The American method of getting results by the quickest means, together with the commercial spirit which too often obtains at the bottom, we must sadly confess has not escaped the noble profession of medicine. Specialism, with all that it represents for good, has unfortunately tended to offer an attractive field for commercial exploitation. It can-

not be disputed for an instant that there are too many specialists. The public, it is our honest conviction, would, if two-thirds of them should be removed by marrying a rich wife, or some other equally certain but pleasant cause, be the better for their removal. The inauguration of some form of examination requisite to a degree would, beyond a doubt, work most beneficially in this direction.

We do not wish to give too pessimistic an opinion, but it is our experience, based on what we have seen here as well as abroad, that the man who has the proper idea of what specialism is, and what preparation for it is required, is a great exception. We can do no greater service to the specialty we love and represent than on every occasion to impress on those who have aspirations to specialize, the seriousness of the undertaking. Individual action alone, however, will not be sufficient. A concerted advance movement to properly standardize our specialty is essential. In our opinion, the time is ripe for such a movement. As a result of the discussion before the American Laryngological, Rhinological and Otological Society two years ago, a committee was appointed to consider the matter. This committee has spent much time in obtaining the views of American and Canadian laryngologists, which they have incorporated in a report which will be presented at the meeting of the Society this week. This report, prepared by Dr. D. J. Gibb Wishart, chairman of the committee, I have had the privilege of examining. It agrees in the main with the views expressed in this paper, namely, that a definite plan or scheme of instruction for special work should be determined upon. As an outline for a more definite working basis, this should consist of the following divisions: First, a thorough preparation in the undergraduate medical school; second, a general preliminary training through several years of practice or hospital interneship; third, at least six months of special instruction, covering not merely the clinical side, but the anatomic, pathologic, surgical, etc.; third, eighteen months of interneship in a special hospital or in the ear, nose and throat department of a general hospital; and fourth, at the conclusion, an examination by a university which should confer upon the successful candidate a postgraduate degree, such as Ph. D. (otolaryngology). The committee is strongly of the opinion that the postgrad-

uate instruction should be given in some established university, and further, that to make the departure a complete success, legislation will be necessary. This, when public sentiment has been aroused, there will be no difficulty in securing. Finally, the committee is of the opinion that any success in this advance movement must be the result of concerted action on the part of the several national societies representing America and Canada, and this association will, in all probability, in due time receive a communication asking it to join in the further consideration of the proposed standardization.

XXVII.

CLINICAL INDICATIONS FOR THE MASTOID OPERATION.*

By W. Sohier Bryant, A. M., M. D.,

New York.

The history of the recent development in the diagnosis, prognosis, and surgical treatment in mastoid surgery is marked by four brilliant achievements: (1) The deductions from bacterial examination of the discharges; (2) the use of the Roentgen ray in disclosing intraosseous conditions; (3) the short convalescence, and (4) the improved hearing after the operation.

Formerly the accepted indications for mastoid operation were: Symptoms of cranial and hemic complications, labyrinthine suppuration, fistula of mastoid process, facial nerve paralysis, abducens nerve paralysis, fluctuation over mastoid region, edema over mastoid region, deep tenderness over mastoid region, rise of temperature, and headache, all associated with middle ear suppuration and chronicity.

These symptoms, in varying combinations, served as indications of the presence of mastoiditis and the necessity for opening the mastoid antrum. At times there was difficulty in estimating the true importance of the various symptoms. It often happened that cases which required immediate operation were delayed because of the absence of some of the classical symptoms, such as pain, tenderness, swelling and middle ear suppuration. Atypical cases, with absence of direct evidences of mastoiditis, were either not diagnosed until it was too late to save the patient's life, or a tedious recovery followed a delayed operation. Until comparatively recently mastoid operations were delayed on principle until softening of the bone had taken place. Expectant treatment

*Read before the Medical Association of the Greater City of New York, at the New York Academy of Medicine, February 17, 1913.

held out the encouragement of convalescence without operation.

Formerly the prognosis and also the results of the mastoid operation were most discouraging. Usually the operation meant a slow convalescence with many painful postoperative dressings, and what was worse, considerable impairment, and sometimes complete loss, of all practical hearing. Small wonder is it that the operation was delayed as long as possible.

The present day indications for a mastoid operation include, in addition to the former indications, several definite elements of preeminent value in both diagnosis and prognosis. The most important of these indications are: First, rise of temperature otherwise unaccounted for and the toxic appearance of a patient suffering from inflammation of the middle ear or with a history of middle ear inflammation. Second, the infallible indication of the presence of streptococci mucosæ in the discharge, together with the determination of the morbidity of the mastoid, reinforced by the skiagram. Third, the demonstration of a solid mastoid in the presence of middle ear suppuration.

The histologic examination and count of the blood cells is useful as a confirmatory diagnostic and prognostic point. By itself it has little significance. When other symptoms are present, their value is so much greater that the deductions from the blood count can be disregarded without weakening the conclusion.

In the presence of streptococci mucosæ, or with the unaccountable rise of temperature and the toxic appearance of the patient suffering from middle ear inflammation, the operation for mastoiditis is infallibly indicated in cases where the skiagram shows a diseased or doubtful appearance. Either of these symptoms may be the only obvious clinical symptom. If there is any doubt that the case is one of mastoiditis demanding immediate operation, the skiagram will establish the final diagnosis.

Bacterial Examination.—Streptococcic infection of the mastoid is the most dangerous infection. Infection by staphylococci or pneumococci is much less likely to produce serious complications. Of the streptococcic infections, those patients infected with streptococcus mucosæ are apt to develop the most serious complications, both intracranial and hemic. An

observation of the greatest importance is the fact that an infection of the mastoid due to streptococcus mucosæ runs a remarkably insidious course with absence of objective symptoms and with slight tendency to resolution without operation.

There are three striking facts about this bacterial differentiation, and these facts demand consideration. (1) The presence of these insidious bacteria often discloses cases requiring operation which would not be performed were it not for this demonstration. The infection is extremely virulent and at the same time the symptoms are latent. (2) Streptococcus mucosæ may cause little or no pain, and no swelling. (3) The presence of this organism is usually indicative of extensive bone involvement or complications, so that it becomes in itself one positive symptom.

Involvement of the mastoid by streptococcus mucosæ demands an immediate operation. If, in spite of this symptom, the operation is delayed, it will be found that soon an emergency operation is demanded.

Skiagram.—The skiagram made by the Roentgen rays is another source of evidence most useful in determining a diagnosis in infections of the mastoid. Like the bacterial differentiation, the skiagram is of especial value in cases which, without its use, might be overlooked. In most cases the skiagram is merely confirmatory; in doubtful cases it gives the prognosis and determines the operation.

The skiagram should accurately portray the external topography and interior structure of the mastoid. It can show empyema of pneumatic cells, softening and abscess formation in the mastoid and surrounding parts, as well as the position of the antrum and sigmoid sinus. The accuracy of the deductions is of course enhanced by the comparison with the sound side, in spite of the fact that in a large number of skulls the internal structure of the mastoid has been found to differ markedly on the two sides.

It has been observed that in normal temporal bones the interior structure of the mastoid varies considerably, grading from pneumatic cellular bone through diploetic bone to dense ivory bone. Clinical observation shows that mastoid infection in the pneumatic mastoid tends either to formation of frank mastoid abscess or to resolution, whereas in the mas-

toid where diploetic or dense bone surrounds the mastoid antrum, a mastoid infection does not form a frank mastoid abscess, nor does it tend to resolution. It tends rather to eventuation in chronic middle ear suppuration or to the formation of the serious intracranial and hemic complications.

The shadows of the skiagram show opacities, the outline of the bone, the internal structure of the bone, and the position of the sigmoid sinus in relation to the antrum and canal. From clearly outlined cells we find varying degrees of opacity to the condition where the whole region is entirely opaque. This total opacity is due either to dense bone or to pus. The intermediate degrees are due to relative degrees of inflammation or thickening of the bone. These conditions are differentiated in this way: As long as the boundaries of the cells are distinct, one infers that there is absence of inflammation. Blurring of the outlines indicates inflammation.

The skiagram also gives a differential diagnosis between middle ear suppuration complicated by otitis externa without mastoiditis and otitis externa with mastoiditis.

In cases where both ears are affected, the skiagram is useful in determining which ear demands operation or whether both ears should be operated upon.

The skiagram shows abnormal bone edges, demonstrating erosions of the bone due to granulations, cholesteatoma and new growths.

The skiagram shows the presence of epidural abscess and perisinus abscess. In fact, the skiagram gives so much important information that the Roentgen ray examination should be employed in every case of middle ear suppuration and in cases of suspected latent inflammation.

A point to be emphasized in connection with the employment of the Roentgen rays is the fact that the skiagram should be made by an expert and should be interpreted by the same expert.

When shall we operate? The means by which we determine the time for operation are: (1) The history of the case; (2) the condition of the ear, as determined by inspection; (3) the presence of general sepsis; (4) symptoms indicating intracranial complications; (5) the formation of an abscess which requires surgical drainage for its proper treatment; (6) a skiagram of the mastoid region; (7) the bacterial exam-

ination; (8) chronic middle ear suppuration which will not yield to other treatment and with cholesteatoma; (9) acute suppuration of the middle ear which has become unreasonably prolonged; (10) acute suppuration when the skiagram shows an absence of the antral pneumatic cell system, and (11) suppurating labyrinthitis. Recourse to the Roentgen ray clears up a doubtful diagnosis, giving, in connection with the other clinical symptoms, positive indications for or against the mastoid operation.

In a dense mastoid process the suppuration does not tend to resolution but to continuation and to the development of the dangerous complications of mastoiditis. In a pneumatic cellular mastoid, inflammation goes on either to abscess formation or to resolution. In mastoids partly dense and partly pneumatic, with the dense areas occurring near the antrum, the behavior of infection is identical with the wholly dense mastoids. These observations show us that with inflammation of the mastoid shown by discharge, skiagram, etc., a mastoid operation is indicated in all but the pneumatic bones, and in them when mastoid abscess has been formed. In other words, in the pneumatic mastoid suppuration, delay the operation until the formation of abscess; while in the dense mastoid, suppurative inflammation of the mastoid is sufficient indication for mastoid operation. In these cases, abscess formation should not be waited for.

The prognosis following the mastoid operation, if the operation is delayed, is much the same as formerly, but the cases which have been operated on at the earliest crucial moment when operation is indicated give a prognosis of speedy convalescence, absence of complications and restoration of normal hearing.

We now know that delaying operation after the crucial time has arrived for an operation results in prolonged convalescence, impaired hearing, intracranial and hemic complications, and their serious consequences.

Prolonged suppuration of the middle ear is a danger to the patient and also progressively impairs the hearing. Since this condition is usually dependent on inflammation of the mastoid antrum, a mastoid operation is demanded both for the welfare of the patient and in order to preserve as much of the hearing as possible.

In conclusion, I would say: (1) Operate when mastoid abscess is present; (2) operate on mastoiditis due to streptococcus mucosæ; (3) operate in the presence of intracranial or hemic complication of middle ear infection; (4) operate on mastoiditis, acute or chronic, when the bone is of the solid variety.

The former indications for mastoid operations were, as we know, very vague. With our more definite and more specialized indications, there is no reason to delay an operation which, in the end, must be performed. An early operation shortens the length of the disease and also shortens the length of convalescence. In other words, there is a quick convalescence from the disease itself, and there is a quick convalescence of the patient, because the course of the disease has been curtailed.

In the meantime, please note that the possibility of serious complications has been prevented.

It is impossible to lay too much emphasis on the fact that we should determine as early as possible whether an operation is demanded. If an operation is demanded, operate at once, and do not wait until the hearing mechanism is so impaired that it will be impossible to restore it. The sooner the operation, the less destruction of parts and, therefore, the less impairment of the function.

XXVIII.

CONGENITAL OSSEOUS OBSTRUCTION OF THE POSTNASAL ORIFICES.*

By C. W. Richardson, M. D.,

Washington City.

In July, 1912, there came under my observation a case of complete osseous obstruction of the postnasal orifices at as early a period in the life history of the case as any other observer has seen such a condition, and at a much earlier period of life than have the majority of the reported cases come under competent medical observation. In an investigation of the literature on the subject, I find only a few cases in which the obstruction was recognized in infancy.

According to Dr. R. Kayser, in Paul Heyman's Handbuch, the first case reported and operated upon in the living was made by Emmert in 1854. Otto, in 1830, reported the first case of closure of the choana in a fetus, and next follows the interesting case reported by Luschka in a newborn dead child, 1859. Following these reports we find numerous cases of the condition reported from the anatomic table, the newborn infant and in child and adult life. It has not been possible for me to tabulate all the recorded cases in the literature, but I should judge that they do not exceed one hundred in number. It is interesting to observe that a fair proportion of cases has been reported by members of this association. The obstruction of the postnasal orifices may be membranous or osseous.

The membranous obstructions are usually formed posterior to the nasal cavities in the nasopharyngeal cavity, but lay in contact with the postnasal orifices so as to completely obstruct them. They extend from the upper surface of the soft palate at the union with the hard palate, and extend to the roof of the postnasal cavity.

The osseous obstructions are usually placed within the nasal

*Read before the meeting of the American Laryngological Association in Washington, D. C., May, 1913.

chamber within a millimeter or more from the free border of the posterior nasal orifices. They are usually composed of thin plates of bone, and may be unilateral or bilateral. To the two above mentioned forms may be added the congenital atresias by which the bones entering into the formation of the postnasal orifice become united, thus more or less completely obstructing the postnasal orifices. Various forms of atresias, excited by disease and deformity, cause obstruction to the choanæ, but, as these are not congenital, they do not enter into the scope of this paper.

On July 30, 1912, I was urgently requested to visit in consultation, early in the morning, an infant just born, who had marked difficulty in breathing. Dr. Wynkoop, who accompanied me on my visit to the infant's residence, told me of the nature of the case and the probable seat of the difficulty. When the infant was brought to me I was impressed with the peculiar cycle of respiratory difficulty with which it was contending. It would lie at rest for barely a moment, with its lips drawn tightly and its cheeks slightly indrawn, when it would begin to struggle for air, the face becoming suffused and slighty cyanosed, the condition being relieved as the child began to cry. As soon as its discomfort was relieved through the mouth breathing necessarily instituted while it was crying, it would cease to cry, with a recurrence of the difficult breathing. The cycle was immediately suspended when the lower lip was pressed down so that uninterrupted mouth breathing was permitted. Examination of the mouth and fauces demonstrated that all the structures in these parts were in normal relation and anatomically perfect. Examination of the nasal organ demonstrated that it was normal in external appearance. Inspection of the nares anteriorly, after removing the copious secretion, evidenced these to be in a normal condition —no adhesions or new growths. Washing out each cavity separately demonstrated that no fluid entered the pharynx, and, after the cavity became filled with fluid, it returned in excess by the anterior nares. The use of a probe proved that at a depth of about five centimeetrs the further progress of the probe was arrested by coming in contact with a firm, rigid, resisting wall. The sensation imparted through the probe when introduced to the bottom of the nasal chamber was as though the end of the probe was impinging upon a firm, re-

sisting plate of bone. The sound conveyed by the impact of the probe was similar to that imparted under similar conditions when a probe strikes a thin plate of bone thinly covered with soft tissues. It was impracticable, as well as considered unnecessary, to make an attempt to examine the postnasal cavity through digital exploration, as the character of the respiratory difficulty and the examination through the anterior nares demonstrated, without doubt, the deformity existing must be a complete obstruction of the postnasal orifices. The maintenance of respiration until voluntary mouth breathing was established and the maintenance of nutrition presented problems to be considered in the management of this case. It seemed that an attempt at operative relief was only to be considered if the life of the child became endangered through its inability to maintain mouth breathing or through malnutrition. The operation itself, without proper protection in the nasopharynx, might be attended with immediate danger, while the hemorrhage and resulting reaction were factors to be considered in an infant so young. Even should the operation become imperative and the procedure have been successfully accomplished, the problem of preventing the closure of the artificially made opening in one so young would have indeed been very difficult. Through a relay of assistants the child's lips were kept constantly apart so that continuous mouth breathing could be maintained, and, through this assistance, at the end of its second week of life, it had learned to voluntarily maintain mouth breathing, thus overcoming one of its great life problems. Its nutrition was maintained very satisfactorily by feeding it through the aid of a "dropper," thus solving the other problem. In a short period after establishing voluntary mouth breathing she learned to manipulate the bottle, alternating in sucking and breathing through the buccal cavity. From this time on the child has continued to develop as any child with normal respiratory organs.

The question to be considered in a congenital occlusion of the choanæ, especially of the osseous type, is the proper time for operative interference. The danger attendant and the difficulty of operating upon one so young, with the impossibility of maintaining the patulency of the opening, after the obstruction has been removed, would seem to argue against

an immediate operation if it be possible to maintain breathing and nutrition. The marked success obtained in the case that I present to you would seem to favor the expectant surgical policy in such cases, as well as the successful issue in many other cases. It would seem that the proper period for such cases would be as early as surgical interference could be done with perfect safety and with an absolute assurance that the manipulation could be made through a cavity large enough not to be embarrassing for want of size, and with a postnasal space large enough to permit of easy introduction of the finger to note the obstruction from behind, as well as to afford protection and serve as a guide. The operation should nevertheless be done as early in life as possible, when the above mentioned conditions have materialized, so that any alteration of the facial skeleton may be forestalled and before any pathologic process has been started in any of the neighboring tissues or organs. It seems to me, therefore, that nothing having arisen to disturb the normal progress of a child with congenital occlusion of the choanæ, about the second year of life would be the most appropriate time to undertake surgical interference.

XXIX.

INTRAOCULAR TENSION IN GLAUCOMA LOWERED BY INJECTION OF THE SPHENO-PALATINE GANGLION.*

By H. Edward Miller, M. D.,

St. Louis.

I wish to record an observation which, as it stands, is simple and does not exhibit any brilliant result, although it proves beyond question an influence between the sphenopalatine ganglion and intraocular tension in glaucoma.

In the December, 1908, issue of the *American Journal of Ophthalmology*, Dr. A. E. Ewing called attention to the relief of pain afforded in glaucoma by cocainizing the sphenopalatine ganglion.

No specific influence has heretofore been proven to exist between the tension and medication of the ganglion.

I am indebted to Dr. W. H. Luedde for the opportunity and cooperation in this case, to which he referred among others, in a paper, "The Usefulness of Schiötz Tonometer," at the meeting of the Medical Association of the Southwest, held at Hot Springs, Ark., on October 9, 1912.

August 24, 1912, Mrs. T. T., a white patient, aged 55 years, had a simple chronic glaucoma involving both eyes. She had been thus afflicted for the past ten years. Five years ago, while a patient at the O'Fallon Dispensary, the sight in her left eye was fair, but her faculty of vision in the right no longer enabled her to read. Both visual fields were much contracted. The use of myotics apparently controlled the condition. The patient refused any operative interference and then disappeared for several years. When she again came under observation, her right eye was absolutely sightless, not even the faintest light perception remaining. The

*Read before the Oto-Laryngological Section of the St. Louis Medical Society, March 26, 1913.

sight of the left eye was so much reduced that she could not find her way about. During the absence of over three years she had been without any treatment except during a brief stay at the Johns Hopkins Hospital of Baltimore, where she again refused to be operated.

The use of myotics had been entirely stopped. Upon resuming them now, Schiötz tonometer registered a prompt reduction in the tension in both eyes, the right from 50 mm. to 30 mm., and the left from 36 mm. to 18 mm. Three days later she came to the office complaining of intense pain in the head, which she ascribed to "catching a cold" while sitting in a draught the night previous.

She had never experienced any pain before. Tonometer examination showed the tension had risen in each eye to a higher point than at any previous measurement, viz., right eye 60 mm. and left eye 51 mm. The sight in the left eye, which had been much clearer after the use of myotics, was "cloudy" again.

Without any ocular treatment the patient was brought to me for a nasal examination, which disclosed a severe general pansinusitis. The swollen membrane was shrunk, and cocain was applied to the area covering the sphenopalatine foramina, with the result that Schiötz tonometer within three-quarters of an hour registered a drop from 60 mm. on the right to 55 mm., and on the left from 51 mm. to 37 mm., before any myotic was used.

Under the combined use of myotics and the nasal treatments the tension became less and less during the next three days, reaching 32 mm. in the right eye and 26 mm. in the left (a drop of 28 mm. in the one and 25 mm. in the other).

The patient was now compelled to return to her home, some distance in the country, but subsequently reported much improvement; headache had almost entirely disappeared and her sight was clearer. The first few days an attendant accompanied her, but now she was able to get about the city alone.

December 24, 1912, patient returned to the city with both eyes in "bad condition for the past three weeks." Treatments at home had been very irregular and unsatisfactory. The tonometer registered 70 mm. in each eye, a rise of over 40 mm. during her absence, and higher than at any time dur-

ing previous observation. The sight in the left eye had fallen from the ability to read letters about one and one-half inches long at five feet, to distinguishing fingers at one foot.

The marked relief afforded by the combined treatment of her nose and eyes before, brought her back with the request that the same procedure be resumed.

The nasal tissue was too greatly swollen to permit of accurate application to the ganglionic area, but no sinusitis existed at this time. Myotics again reduced the tension, especially in the left eye, and sight became clear enough to see large letters at four feet on the third day.

Two days later a subconjunctival injection of 5 per cent sodium citrate solution was made in the right eye, resulting in a markedly lessened tension in both eyes, even greater in the eye opposite the one injected, dropping 20 mm. However, within two days it was as high as before. Nasal treatments were continued, but the futile attempt to make an appreciable impression upon the tension induced me on January 13, 1913, to begin the ganglion injection method as described by Dr. Greenfield Sluder, December 30, 1911, in the *American Journal of Medical Sciences*.

I used a straight needle, and estimated about one-third cm. penetration in a direction backward, upward, and outward from the bony posterior tip of the middle turbinate. About six minims of a 5 per cent alcoholic solution of phenol was injected. Patient immediately felt a "new pain" starting in back of her ear and extending down her neck to the shoulder. This disappeared in about two hours. Tension quickly rose, but on the following day had dropped fully 20 mm. Directly after injection the patient complained of complete loss of sight, but this soon disappeared, and she could see better than at any time during the past four months. On the morning of the fourth day after this first injection a rise of about twenty points was noticed, and now the right ganglion was injected. Myotics had been regularly continued all this time. The same gratifying bilateral drop in tension was produced and a greater clearness of sight in the left eye.

Failure to obtain the typical reaction after injection oftimes results from the inability to reach the ganglion.

A total of seven injections were made, of which two should be dismissed; in the one the needle failed to reach the gan-

glion and likely entered the sphenopalatine artery, for a profuse hemorrhage occurred and the patient weakened so as to become bedridden for several days; the other injection followed the news of severe illness of her husband and the request for the patient to return home against her wishes.

Unexpected excitement always caused quite a rise in tension in this case. Irritants, such as formalin or argentum, had no apparent effect on the tension when applied over the sphenopalatine foramen.

Averaging the other five injections, we find the immediate result after injection was a rise of an average of 10 mm. Within twenty-four hours the average drop was 17½ mm. from the original scale. The minimum drop was 7 mm. The maximum was 28 mm.

XXX.

PERITONSILLAR PHLEGMON—REPORT OF A CASE.*

By F. E. Hopkins, M. D.,

Springfield, Mass.

Limited by the character of the case I have to report, my title should be phlegmon of the peritonsillar space, rather than the comprehensive one of "Phlegmon of the Upper Air Passages," under which it appears in the program. The principal point which it illustrates is the possibility of erosion of large blood vessels.

As to the cause of peritonsillar infections, we readily accept the bacteriologist's dictum that the throat at all times harbors bacteria ready marshaled for invasion; and since the crypts of lymphoid tissue are portals easily assailed, infections of this region should be frequent and systemic involvement severe. The wonder is, not that phlegmons threatening life occasionally develop, but rather that such serious invasion is so rare that an active professional life may pass and not a single case come under observation.

I leave to the bacteriologist the naming of the invading host and of the allies which join with eager savagery in the campaign; and I leave to him, too, the naming of the armies of defense, both of the first and of the second line, adopting for myself the general terms of virulent or aggressive infection, and a lowered resistance on the part of the patient. Pardon this seeming levity—it is only seeming. Bacteriologic literature, with its explanations of infection and resistance, gives this kind of a picture, and though the language of this branch of science is not at my command, the reference will be understood.

Such microscopic examinations of pharyngeal phlegmon as I have on record give as a usual finding staphylococcus aureus,

*Read before the American Laryngological Association, May, 1913.

with in some cases a mixed infection—the most troublesome addition being streptococci. The staphylococci alone fulfill their contract for destruction with less systemic disturbance than when working in alliance with others.

However, microscopic findings are of little value in determining the treatment of these cases. The stage of progress decides that, and early, effective drainage is the best assurance of a favorable prognosis.

Peritonsillar phlegmon may run its course to serious complications with less systemic disturbance—as shown by prostration, temperature curve and pulse rate—than is the rule in follicular tonsillitis. The pain and distress may be great, with the temperature not above 101°, and a pulse of from 80 to 90.

Suffocation from flooding the larynx by the sudden rupture of the abscess has been reported, and tracheotomy has been required because of closure of the phraynx by infiltration and edema; but the complication I wish to emphasize is that of erosion of blood vessels by the necrotic process.

When only the tonsillar artery is involved the hemorrhage may cease spontaneously or be easily controlled; if the ascending pharyngeal, the situation is very serious, while a break in the wall of the internal carotid brings a swiftly fatal end. As illustrating invasion of the first or smallest of the three arteries, Dr. Bates of Springfield has recently described to me a case of active hemorrhage following the spontaneous rupture of peritonsillar abscess. Bleeding ceased without a resort to either pressure or ligation.

Bosworth's work, with its painstaking research of literature, was published twenty years ago, yet the chapter on peritonsillar phlegmon is still the fruitful source of reference. He gives a list of twenty authors, who, over a period of forty years, had reported cases of involvement of the large vessels during the course of phlegmon. Of all the cases reported but five recovered, and the inference is that in these only the smaller vessels were eroded.

Nearly all the recent textbooks speak of the possibility of this destructive invasion of blood vessels, but none of the authors I was able to consult mentions a case or refers to one.

The case whose brief history follows was under the care of Surgeon Major E. A. Gates of Springfield, Mass. I saw

the patient in consultation on May 23, 1900, and found: H. M., male, American, twenty-six years of age, of poor resistance because of irregular life and recent acute illness. He had suffered from measles early in the month, and while convalescing had taken cold—according to his own statement—the particular manifestation of this cold being a sore throat. There was a marked peritonsillar swelling upon the left side, with severe pain, but the patient was not prostrated, being at this time dressed and about the house. His pulse was 80 and temperature 100,° and during most of this illness the pulse rose only to 80 or 90, and the temperature at no time exceeded 101.° No fluctuation could be made out. I saw him again on the 24th, and although the cellular infiltration had increased there was no evidence of "pointing," nor could fluctuation be felt. Deep incisions were made, but these yielded no pus, and little bleeding took place. Two days later a hemorrhage occurred, which the attending physician controlled by pressure. A terrific hemorrhage recurred on the 27th and proved quickly fatal. A postmortem was not allowed, but such examination as could be made immediately following death showed rupture through the posterior pillar—the flood from the eroded carotid finding exit here.

Such a mass of cellular infiltration should be explored by a blunt instrument, even the finger, following unfruitful incision. In this case, the patient—an only and spoiled child—objected vigorously, as did the parents; and as a peritonsillar abscess usually ruptures into the incision or burrows its way to the surface, further interference was not insisted upon, with the unusual result named.

XXXI.

PRIMARY TUBERCULOSIS OF THE MIDDLE EAR.

By Chas. H. Long, M. D.,

Chicago.

There is probably no disease to-day more widely discussed, not only by the physician but by the laity as well, than the "Great White Plague." For many years it has claimed the attention of some of our greatest scientists. Koch's discovery of the tubercle bacillus in 1882 was of unprecedented value to the profession; and since that time, particularly during the last decade, marked advancement has been made in the knowledge of tuberculosis. While clinical research continues, efforts are exerted to utilize each progressive step for the enlightenment and benefit of mankind. While some theories have been so conclusively proved by experimentation and application that they have become of universal practical value in diagnosing cases and for the treatment and prevention of tubercular infection, there are still many questions open to discussion. Concerning these, we must accept the opinion of the majority until more extensive investigation and time shall prove or disprove them.

Before proceeding to the subject of primary tubercular infection of the middle ear, which is the purpose of this article, let us take a brief survey of the present tubercular situation as it is presented to us by recent scientific workers and by personal study and observation.

There has been much disputation as to whether the human and bovine tubercle bacilli differ or are identical. Theobald Smith claimed to have found "many distinct differences." Koch[1] believed the difference to be one of type, rather than species, the position now taken by all who support a differentiation between the two groups. Koch further stated his belief that this difference is sufficient to influence the combating of

the disease. Others[2] believe in the unity of the human and bovine bacilli, maintaining that, while there are marked differences in cultural growth and virulence between the two "so-called types," these types vary within themselves in the same way to such an extent that the difference in the groups overlaps, making it impossible to consider the one group as an entity distinct from the other. The English Royal Commission[3] confirms this instability of type, and concludes that the gap between the two types is not a wide one, while Whitla[4] states that the conclusion of the "great majority of recent workers is that the human and bovine types of bacilli are identical."

Whatever the decision in this regard, there is now a general agreement upon one point,—the danger to man of infection from both types of bacilli. The English Royal Commission, in their report of 1911, state as follows: "We have investigated many instances of fatal tuberculosis in the human subject in which the disease was undoubtedly caused by a bacillus of the bovine type, and nothing else. We have compared the lesions from such cases with those obtained from parallel cases of fatal tuberculosis in which the human tubercle bacillus alone was discovered. Except for the difference in the type of bacillus found in them, these two groups of cases presented similar features; the clinical histories of the cases were alike, the cases all terminated fatally, and the lesions examined after death were found to be anatomically indistinguishable." To quote Professor Ravenel:[5] "Laboratory investigations have shown beyond question that bovine tuberculosis is transmissible to human beings and that the lesions produced do not differ in any way from those caused by human bacilli."

Considering these facts, is it then worth while to pause to discuss the much agitated question of the possibility of the human bacillus affecting cattle? It is interesting and perhaps valuable to know that the resistance of bovines is so great that the feebly virulent human bacilli can ordinarily have but little effect upon bovine tissue. This, however, seems not the salient point in the matter. When we observe the destructive inroads made by the bovine bacilli in the human being, does not the question of bovine susceptibility shrink into insignificance?

Again, in view of these facts, whatever its source, water, milk, milk products, or ordinary dirt, the infection of mankind by bovine tubercle bacilli should receive our careful attention.

Though the extent of danger is still in doubt, if we adhere to von Behring's[6] theory of latent infection, if we incline toward a growing conviction that, after all, the one type may be transformed into the other after long-continued residence in a particular host with all conditions requisite and favorable to such transformation, or if we advocate the popular theory[7] that the surgical forms of tuberculosis are due to bovine bacilli, which may also produce miliary tuberculosis; in any case, we cannot but be convinced of the perils of bovine bacilli to mankind. We do not, as some accuse, "minimize" the danger of infection by human bacilli by emphasizing the work of the bovine type. We merely hold that the latter infection has a significance which may not be generally appreciated.

It is universally recognized that age is an important factor in the infection of tuberculosis. The disease is considered preeminently one of childhood. The physical conditions, environments, and food of the child render it practically impossible for children to escape the inception and harboring of the bacillus. Though its presence is not always immediately evident, the seed is sown and awaits only the opportune moment, favorable soil conditions and lowered resistance to begin its destructive activity. The prevention of implantation is one of the means of eradicating the tubercular evil. Then must we consider first the question of tuberculosis and the susceptible child. Though much is being attempted to better existing conditions, yet more should be done. We fail to see how civic governments can consider it unnecessary to improve the public milk supply, in the face of such statements as the following, made by the English Royal Commission:[8] "A very considerable amount of disease and loss of life, especially among the young, must be attributed to the consumption of cow's milk containing tubercle bacilli."

It has been fully demonstrated that certain tissues of the human body exhibit a greater susceptibility for the tubercle bacilli than others. The lungs offer the best example of these, and, in consequence, are most frequently primarily infected. On the other hand, some tissues are so rarely invaded that many believe that their infection as a primary condition never occurs. To this latter class belongs the middle ear. Although Milligan,[9] after years of observation, concludes that primary tubercular infection of this organ is a comparatively common

condition, he meets with little support and much contradiction of opinion; some experienced otologists even maintaining that the infection is never primary, being always secondary to the disease elsewhere, usually with a pulmonary focus. While few assume this extreme position, yet the general consensus of opinion inclines toward the rarity of the condition, which is not surprising when we consider the limited number of cases reported and the great difficulties in eliminating early, or latent tubercular infection.

Until the year 1903, according to Goldstein,[10] but three cases of primary infection of the ear had been reported. To these he added four. Recently, others have been presented, and, although there may be doubt as to some of these being primary, the remaining unquestionable ones give sufficient proof of the existence of a primary infection of the middle ear. Until it can be proved that some one part of the human system is immune to the invasion of the tubercle bacillus, the possibility of this condition cannot be authoritatively contradicted.

The following case which I have to report, appeals to me as one of special interest, in view of the extreme youth of the patient.

Case 1.—G. W. English, age, eleven months, female. According to the parents, the child at the age of one month appeared to have a severe cold. Both nose and eyes discharged for a couple of days, which was followed by a discharge from the left ear. The family physician treated the ear for some time by syringing, but no improvement resulted. February 1, 1910, she was brought to my clinic at the Post-Graduate Hospital by the mother. Examination revealed a profuse fetid purulent discharge from the left ear. The lining of the external auditory meatus was red and irritated. The tympanic membrane was absent. The probe revealed necrotic bone. The examination of the throat showed enlargement of the pharyngeal tonsil, which seemed to interfere with nasal breathing. This was removed. In all other respects the child appeared perfectly healthy. The treatment applied consisted of ordinary cleansing and Politzerization until April. No improvement resulting, a smear was taken and submitted to Professor Zeit of the Northwestern University for examination. He reported the presence of tubercle bacilli in the discharge. Owing to the child's youth, it was impossible to de-

termine the exact condition of the hearing, but it appeared little impaired. The cervical glands were not enlarged and there was no tenderness or swelling over the mastoid process.

April 29, 1910.—The radical mastoid operation was performed. Only remnants of the malleus and incus remained. A mass of granulation tissue virtually buried the stapes, the granulations extending into the antrum. All were carefully curetted away with the exception of those around the stapes. The postauricular wound was dressed open. Owing to the rapid growth of immense flabby granulations, healing was protracted and many currettements were necessary.

June 2, 1910.—The postauricular wound had healed and the meatus was dry. About the middle of May the right ear was found to be discharging. Professor Zeit reported a pneumococci infection, but no tubercle bacilli. This ear was soon well.

October, 1910.—The child was suffering from a cold, and both ears were discharging after being dry for four months. No tubercle bacilli were discovered, and the response was negative to both the Moro and von Pirquet tuberculin tests.

October, 1911.—The last report of the case came at this time. Both ears were dry and, according to the mother, the child was in general good health. Up to the time I first saw her this child had never been given cow's milk or artificial food of any description. She did not appear to suffer pain in her ear, while she was so noticeably good natured that callers were impelled to remark about the attribute.

In our conclusion that this was a simple case of primary tuberculosis of the middle ear, we considered the following: The child's youth at the period of onset of the disease, its continuous general good health, the absence of tubercular infection elsewhere, as proved by the negative tuberculin tests after the radical mastoid operation, and the ultimate satisfactory condition of the ear.

As to the source of the disease, little need be said, although the child, to the best of our knowledge, was given no cow's milk or artificial food, the ignorance and carelessness of the laity afford ample opportunities for infection. The theory of predisposition and inherited tendencies was not regarded here, as there had been no instance of tuberculosis in the family and the parents of the child were in perfect health. The case being a surgical one, suggests a bacillus of the bovine type and the attack a result of dirt infection.

While there are many possible avenues for the inception of the disease, the features of the case eliminated all but two—the eustachian tube and the external auditory canal, with the probabilities in favor of the former.

The examination of the ear discharges determined the nature and localization of the disease, and the radical operation was performed in time to arrest its destructiveness. In support of this operation, which is often criticized, we maintain that if any operation is advisable, it should be of a radical nature, especially when the disease is localized. Surgeons have regretted its omission when further developments showed that its timely performance might have prevented a fatal termination of the disease.

Despite the constant advice to be ever upon the alert for the first indications of the tubercular disease, some of us fail to recognize the infection in its incipient stage. If the physician and bacteriologist would more frequently cooperate, there would be fewer disappointing results. While this reference is but an added stroke to the well worn nail, its insertion may be of benefit to some co-worker.

Let us not slumber while the foe invades; then become pessimistic, but "take arms against a sea of troubles, and by opposing, end them."

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XXXII.

REPORT OF A CASE OF TEMPOROSPHENOIDAL ABSCESS OF OTITIC ORIGIN—OPERATION—RECOVERY.*

By James F. McCaw, M. D.,

Watertown.

The subject of this report was a female, 44 years of age, married, seen in consultation on April 27, 1912, at the City Hospital. The following history was obtained: She had suffered from a severe head cold six weeks before, which was followed in a few days by severe pain in the right ear and discharge thirty-six hours later, with only silght relief of the pain; these symptoms continued, and for about three weeks before coming to the hospital, she had suffered such severe pain over entire right side of head that the physician in attendance had kept her under the influence of large doses of morphin and free administration of whisky. On the above date another physician was called, and realizing the gravity of her symptoms, sent her to the hospital at once and asked me to see the case.

Upon examination her temperature was 100.6° F., pulse 102, respirations 20. Her face showed great suffering and anxiety; there was a very profuse, thick, creamy, purulent discharge from the right auditory canal, the membrana tympani was intensely congested, thickened and edematous; there was a small oval perforation in the lower posterior quadrant, through which pulsating pus was being discharged. There was such marked bulging and drooping of the upper posterior quadrant and the posterosuperior canal wall that the perforation was just visible. There was decided swelling and edema over the entire mastoid area and extending well above the antral region. This entire area was exquisitely sensitive

*Read before the American Otological Society at Washington, D. C., May 6, 1913.

to touch and severe pain elicited from the slightest manipulation. On assuming the erect posture in bed, dizziness was complained of. Mentality seemed dulled, but all questions were answered correctly; no nausea or vomiting. Convulsive seizures were absent, and no evidence of muscular paralysis. Both eye grounds were normal. Urine analysis negative.

I operated upon this case the next morning, using the usual mastoid incision. After elevating the flaps and periosteum over the mastoid area and also from the tip, a very extensive bone necrosis was encountered, so that the lower half of the outer table, including the tip, was a sequestrum and was lifted out whole. From necrosis of the inner table, about an inch and a half of the sigmoid sinus was exposed, covered with pus and exuberant granulations. After cleaning out all necrosis and granulations, my attention was next given to the tegmen antri, which was soft, and with a curette and rongeur this was carefully cut away, exposing the underlying dura, which was very much thickened, discolored and felt resistant. An incision through the dura at this point opened directly into an abscess cavity from which was evacuated about a dram and a half of pus. The cavity, which was about one and one-half inches in depth, was carefully wiped out with cotton sponges, and upon examination there was no apparent limiting membrane, but the cavity seemed to be directly within the brain tissue, clearly demonstrating that it was a very acute and recent process. The outer opening through the dura was enlarged and a strip of iodoform gauze was carried in and packed loosely into the cavity. The mastoid wound was dressed in the usual way. Blood count at this time showed a leucocytosis of 13,200 and a polynucleosis of 84 per cent.

For three days following the operation the patient complained of considerable and severe pain over the right side of head, with nausea and vomiting, restlessness and irrational periods. The temperature kept steady between 100° F. and 100.8° F. during this time, and the pulse from 78 to 90. Blood count, taken each day, showed diminishing absorption with good resistance, so we began to look about for something else to account for this train of untoward symptoms, which seemed quite alarming, when it occurred to the writer that perhaps the withdrawal of the amount of whiskey and morphin which she had been accustomed to for six weeks was

responsible for this postoperative development. With this idea she was put on chloral gr. iii and sodium bromid grs. xv, three times daily and at night if necessary. It was a most noticeable fact that all the cerebral symptoms disappeared promptly, her temperature was normal two days later, and she had no further symptoms of this character.

The first dressing was done on the fifth day, and the gauze removed from the abscess cavity, which was perfectly clean and without retention, the dural opening patulous. The cavity was dried out with pledgets of sterile cotton and one strip of iodoform gauze inserted. It was dressed every second day, and on the ninth day following the operation all gauze was left out of the abscess cavity, as it had contracted down to almost nothing and simply showed a depressed granulating surface. From this time on the patient made an uneventful recovery.

This report is made not so much for its importance as a contribution to this society, but simply that it may be on record for its clinical value. However, there are several points of interest in it from a clinical standpoint. The first to be noted is the difficulty in making a correct diagnosis of intracranial complications before operation. This case illustrates that point very clearly, as the patient gave no symptoms of which has been pointed out by Sondern to be a good indicabrain abscess prior to its discovery at the time of operation. The dizziness complained of, I think, can be explained by the extreme intratympanic pressure, the mental dullness was attributed to the influence of the morphin which she had been taking.

We also have in this case an illustration of the importance of weighing very carefully all postoperative symptoms and eliminating all possible sources of their development before deciding that they are dependent upon an extension of the original infection, and still further complicating the case by an unnecessary operation. I feel sure that had I assumed from the misleading postoperative symptoms present that there was further brain involvement, and made an exploratory operation, I would have jeopardized my patient's chances of recovery.

I want to again call attention to the value of daily blood counts as an aid in arriving at a correct diagnosis in cases

where there is much apprehension and puzzling symptoms. Especially is it of importance in postoperative cases of septic intracranial involvement, which may, as in this case, develop alarming symptoms, dependent upon some intercurrent condition. It was of the greatest value to me in this particular case, as I would have been strongly inclined to reopen the brain wound, in view of the alarming symptoms, had not the blood counts taken daily shown a diminishing polynucleosis and a steady leucocytosis, thus shortening the resistance line, tion.

My method of packing the abscess cavity might perhaps be criticised, in view of the experience of many of our best operators, but my decision to use the iodoform gauze was based upon the fact that it was a small cavity, showing a tendency to contract, and that I was able to enter it directly along the route of the infection; therefore, in all probability the brain coverings were thoroughly amalgamated over this area, thus minimizing the possibility of a septic meningitis. The result in this case was a perfect recovery.

XXXIII.

SINUS THROMBOSIS FOLLOWING NECROSIS OF PERIOSTEAL FLAP.*

By Otto Glogau, M. D.,

New York City.

Mr. P. D., 40 years of age, came into my clinic at St. Mark's Hospital Dispensary, on November 5, 1912. He was complaining of severe pains and entire lack of hearing in the left ear. The pains lasted for two weeks. The ear was running, a small perforation at the posterior superior quadrant of the drum being present. The drum was inflamed and bulging. There was much sensitiveness to pressure over the antrum and at the tip of the mastoid process.

A paracentesis was performed, and the patient was directed to make hot applications and irrigations for two days. After this the ear discharged freely, the pains and the general condition of the patient became worse.

On November 8th he was admitted to St. Mark's Hospital with a temperature of 101.° The next day I performed on him a simple mastoid operation. The usual curvilinear incision was made, the skin and adjacent tissues were divided down to the fascia. I then formed a Leland periosteal flap. This was the first time I had tried Dr. Leland's method, which so very much impressed me at the demonstration in Boston, before the Ninth International Otological Congress. In forming the periosteal flap the rules laid down by Dr. Leland in his paper were closely adhered to: "The classic curvilinear incision is made from the level of the upper insertion of the auricle to the mastoid tip, one-fourth inch behind its posterior border, dividing the skin and subjacent tissues down to the fascia. The tissues are then dissected forward to the cartilaginous meatus, and backward as far as it is possible to go, by

*Read before the New York Academy of Medicine, Section on Otology, February 14, 1913.

lifting up the skin, say one and one-half to two inches. The flap is then to be formed of the periosteum and fascia and the connective tissue between them. To this end the knife is introduced at the posterior border of the tip of the process at right angles to the surface down to the bone, the tip of the left index finger being used as a guide to prevent injury to the emissary vein. From the tip the knife is carried upward and backward along the posterior border, then backward horizontally for one-half to one-third inch or more, then directly upward to the temporal line, then forward to the posterior border of the external meatus, but about one-half inch above it. This periosteal flap, including the attachment of the sternocleidomastoid muscle, is then removed from the bone with a strong elevator, which sometimes is not accomplished without considerable difficulty. We then have a flap of considerable thickness with a broad vascular attachment anteriorly." (George A. Leland, Boston: "A Periosteal Flap in Mastoid Operations," Transactions Ninth International Otological Congress, Boston, 1912, p. 259.)

The periosteal flap having thus been formed, the mastoid cavity was opened. At the first stroke of the chisel the sinus became apparent, surrounded by pus and granulation tissue. The protective granulation wall of the perisinus abscess had apparently left the sinus intact; its color was normal, there were no symptoms pointing to a thrombus. All cells of the mastoid process had been destroyed and replaced by pus and granulations. The mastoid cavity was thoroughly evacuated, and also the granulations around the antrum removed and the antrum itself enlarged. The cavity was then washed by warm normal salt solution.

Leland's periosteal flap had been formed before it was ascertained whether there was an exposure of the sinus present or not. Although Leland had applied his method only in uncomplicated simple and radical mastoid operations, the writer decided to make use of the periosteal flap present, in order to test its applicability in complicated mastoid conditions. Following the instructions of Dr. Leland, the flap "was brought down to cover the aditus, and a bit of the tip to lie against the inner wall of the antrum. The tip was anchored in the proper position in the aditus by the rounded

end of a thick gauze wick, packing it tightly down; and the rest of the flap against the posterior surface of the thin meatal wall. The outer part of the cavity was very lightly packed with gauze, and the lips of the skin wound sutured to bottom, leaving a length of about an inch through which the packing protruded." Special care was taken to keep the flap away from the exposed sinus. Four days after the operation, at the first dressing, the loose gauze, but not the anchor, was removed; the temperature began to rise and reached on the fifth day 104.4.° The patient was suffering from very severe pains on the left side of the head, and especially upon pressure alongside the inner margin of the sternocleidomastoid muscle. He began to cough and to feel unpleasant sensations in the chest. The next day the temperature dropped down to 101,° and the patient suffered from exhaustive perspiration. On November 17th (eight days after the operation), the temperature rose to 105.° This rise in temperature was preceded by a severe chill lasting for eight minutes.

As all symptoms pointed to the presence of a sinus thrombosis, the writer decided to explore the mastoid cavity. On November 17th an incision was made through the old wound and the cavity exposed. The periosteal flap was found dislodged from the antrum and covering the sinus; it had apparently become entirely necrotic. The sinus showed grayish discoloration and felt hard on palpation; pulsation could not be detected, nor did dilatation take place above the compressing finger. By removing the intervening bone the sinus was then exposed downward to the jugular bulb and backward to the torcular, and was found to be discolored and hardened to that extent. An exploring needle was inserted and no blood could be aspirated from the sinus. The sinus wall was then incised through its entire thickness. No bleeding occurred, as the sinus was found to be filled with a thrombus reaching both to the torcular and to the bulb. The writer decided to ligate the jugular vein prior to the removal of the thrombus. The mastoid wound was therefore temporarily covered with gauze and the neck antiseptically cleaned. The incision was made alongside the anterior margin of the sternocleidomastoid muscle, extending from the level of the angle of the upper

jaw to the cricoid cartilage. After dividing the superficial tissues by the scalpel, the deeper structures were reached by blunt dissection and the common sheath opened. The jugular vein was then exposed, after being carefully separated from the pneumogastric nerve and the carotid artery. The vein was apparently filled with a blood clot down to the entrance of the facial vein; half an inch below the latter the jugular vein was ligated in two places, one inch apart, and severed. The jugular vein was then exposed high up towards the jugular bulb and ligated as near as possible to it; after ligating the tributary veins the thrombosed portion of the jugular was removed. A rubber tissue drain was then inserted from the upper to the lower end of the wound and the incision closed above it. The packing was then removed from the mastoid wound and the thrombosed sinus gently curetted down towards the bulb and backward towards its torcular end, until free flow of blood occurred. The lips of the opened sinus were compressed by gauze and the mastoid wound packed.

The next day the corresponding side of the face became swollen and edematous; this condition disappeared after five days. The temperature dropped immediately after the operation and with slight remittances soon approached the normal. The wounds on the neck and ear healed rapidly. The patient made an uneventful recovery and was dismissed from the hospital eleven days after the removal of the thrombus. The mastoid wound closed three weeks afterwards by granulation.

About one month later the patient developed an acute mastoiditis on the right ear and was operated upon by the writer. The wound was closed by subcuticular suture with small secondary counter drainage.

The patient was not presented with the idea of reflecting generally upon Dr. Leland's method of periosteal flap formation. Although strictly formed after Dr. Leland's instructions the flap did not adhere to the antrum, but became dislodged and encroached upon the sinus. Dr. Leland himself had a few cases where "the flap had pulled away from the aditus." He ascribes this accident to the shortness of the flap, and advises "to tear it away from its new attachment and repack it

over the antrum." It is difficult to decide whether the periosteal flap in this case became necrotic from lack of proper nourishment or from infection by the granulations covering the sinus. However it may be, the sinus thrombosis was doubtless due to necrosis of the periosteal flap. The writer has no experience with the periosteal flap in uncomplicated mastoid operations. The above case teaches merely that the periosteal flap should never be made use of where there exists an exposure of either the sinus or the dura.

XXXIV.

A CASE OF PARALYSIS OF THE ABDUCENS NERVE ASSOCIATED WITH ACUTE MASTOIDITIS.*

By Harold Hays, M. D.,

New York City.

During the past winter, Dr. Charles E. Perkins reported six cases of paralysis of the abducens nerve associated with a suppurative condition of the middle ear. He also collected ninety-five cases from the literature. In all of his cases the paralysis disappeared within a few months. Perkins claims that the paralysis is often due to the narrowing of Dorello's canal "from inflammatory thickening of its walls, or the thickening may arise from edema caused by inflammation in the neighboring dura or bone." This narrowing, however produced, would result in pressure upon the nerve or abducens paralysis; or the inflammation may extend to the nerve itself, causing neuritis with consequent loss of function.

In December, 1911, Dr. John R. Page reported a case of sinus thrombosis followed by abducens paralysis.

I wish to add the following case to those already recorded: J. D., 17 years old, was admitted to Dr. Robert Lewis' service at the New York Eye and Ear Infirmary, September 7, 1912. Immediately after sea bathing, a month before admission, the patient began to have pain and a ringing sensation in the right ear, and the following day the ear began to discharge. This discharge was continuous up to the time of admission with very little pain. He had considerable headache over the right temporal region. There had been no previous trouble with the ear.

Examination of the right ear showed a perforation at the middle of the posterior quadrant, and the canal was filled with pus. There was no mastoid tenderness. The left ear was negative. General physical examination, negative. Tem-

*Read before the New York Academy of Medicine, Section on Otology, February 14, 1913.

perature, 100.8°; pulse, 92; respirations, 20. September 9, 1912, the patient has had constant pain on the right side of the head. Diplopia developed six days previous. There occurred a paralysis of the right rectus muscle. Nausea and vomiting came on two or three times a day for six days. There was no mastoid tenderness. Free purulent discharge from canal. Knee-jerk reflex diminished on right side. Kernig sign negative. Rhomberg and Babinski reflex negative. Slight papillitis in right eye. No nystagmus. Temperature, 105°; pulse, 112; respirations, 28. Urine examination showed slight trace of albumin. Examination of pus from canal showed principally epithelial cells. Blood count: White blood corpuscles, 10,000; red blood corpuscles, 5,400,000. Differential count: Large mononuclears, 4 per cent; small mononuclears, 17 per cent; polynuclears, 79 per cent. Blood culture (15 cc. of blood) showed two colonies of staphylococcus aureus in twenty-four hours. X-ray picture of mastoids showed that they were diploetic and both sinuses well forward. On the right side was a small oval shadow about half way down below the knee and posterior border of the sinus, which was either a cell or perisinus abscess. (This proved to be a small cell over a large opening of the mastoid vein into the sinus.) Wassermann negative.

On the afternoon of September 9th a simple mastoidectomy was performed, on account of the paralysis of the sixth nerve, the high temperature, the peculiar symptoms and because of the X-ray finding. The mastoid was found to be quite sclerotic with only a few fairly large cells which were filled with granulations. No free pus was found. The sinus was intentionally exposed throughout a great part. No dura was exposed. The antrum was opened and curetted out, the tip was completely removed. The wound was partially closed with clamps and packed with iodoform gauze.

A lumbar puncture was performed on the table; 15 cc. of clear fluid under slight pressure was withdrawn. This contained no traces of albumin. There was no appreciable sediment in the contrifuged specimen. The culture of this fluid was negative after twenty-four hours.

The following day the temperature was 101.2°; pulse, 84; respirations, 24. September 12th, wound cleaned. Slight discharge from canal. Patient says diplopia is less marked.

There is a well marked nystagmus on rotation of the eyes to the left. There is no nystagmus to the opposite side. With an object held at a distance of about a foot from the eyes, diplopia is noticed as soon as the object moving from left to right passes the midline of the body. Urotropin was given every four hours. Examination of the eyes showed that the papillitis had practically subsided. September 26th, patient complained of slight headache. September 30th, distinct exophthalmos on right side. There is some tenderness over the right frontal sinus. X-ray negative. October 24th, wound healed and patient has left the hospital.

Perkins in his paper remarks that intense headache, "especially in frontal region, severe pain in the eye or deep in the orbit, neuralgia of the fifth nerve, or paralysis of some of the muscles supplied by it, are symptoms, one or more of which have been noticed in fifty-five out of ninety-five cases reported." This means that there is some interference with the Gasserian ganglion by the process going on at the apex of the petrous bone. Gradenigo first called attention to the severe pains in the frontal and parietal region associated with purulent discharge from the ear and abducens paralysis, and therefore this is called Gradenigo's syndrome.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOLOGY.

Meeting of January 10, 1913.

Report of Cases of Inflammatory Diseases of the Labyrinth.

Dr. Wendell Phillips said that the cases presented represented the work done by himself and his assistants in hospital and private practice during the past two years, and were presented just as the histories read. In the light of more recent improvements in the recording of histories, some of them showed errors; the more recent records, however, were more carefully made, and consequently were more readable and understandable.

Simply the reports of the cases were presented, without comment, in order that the members might have a faithful statement of what had been done.

Lantern Slide Demonstration of Section of the Temporal Bone, With Special Reference to the Anatomy of the Labyrinth; Also Exhibit of Microscopic Specimens Demonstrating the Histology of the Internal Ear.

By Isidor Friesner, M. D., and Alfred Braun, M. D.

(*By Invitation.*)

Paper: Model Reconstruction of the Vestibular Apparatus.

By Eugene Lewis, M. D.,

Dubuque.

(*By Invitation.*)

DISCUSSION.

Dr. Kerrison, in opening the discussion, said that in the number and character of the cases reported, this meeting was one of the most interesting and notable which the section had held.

Considering the serious character of the cases reported by Dr. Phillips, the results, taken as a whole, were exceptionally good and a subject for congratulation. It was worthy of note that in the fatal case reported by Dr. Phillips—i. e., a case of diffuse suppurative labyrinthitis in the latent stage—a radical operation had been performed without operating upon the labyrinth. This patient died of meningitis. Dr. Kerrison said that he had himself published the report of a somewhat similar case in which he had followed the same course, his patient dying later of cerebellar abscess. Personally, he was firmly convinced that in the long run it would be found safer not to do a radical operation upon patients suffering from any stage of suppurative labyrinthitis without at the same time providing surgical drainage of the labyrinth.

In two cases which recovered without operation upon the labyrinth, Dr. Phillips reported having found a fistula leading into the vestibule, into which a tympanic probe could be introduced and brought out through the open oval window. Drainage of the vestibule had therefore been provided by the necrotic process. Recovery in these two cases without operation would seem to support the proposition that adequate drainage is the chief desideratum in suppurative labyrinthitis. Dr. Fowler has reported an instructive case of long-standing middle ear suppuration, in which the tympanum was to a very considerable extent epidermized; yet later a large sequestrum, including parts of the labyrinth, came away. Such a case provides a graphic illustration of the possible progress of a necrotic process beneath an epidermal covering; and it supports the argument that a radical operation is not a safe procedure so long as a suspected focus of infection within the labyrinth remains undrained.

The speaker said that the cases reported by Dr. Kopetzky were very interesting, and the good average results seemed due to the good judgment the doctor had shown in determining which should and which should not be operated upon.

Dr. Kerrison said that he had listened with a great deal of interest to Dr. Lewis' lecture. To review the physiology of the vestibular apparatus in terms sufficiently clear to be easily followed was in itself something of a feat. Dr. Lewis had not only accomplished this, but had held the interest of his hearers throughout. The points in which Dr. Lewis differed

somewhat from the accepted views of vestibular physiology—e. g., in his eplanation of the production of certain forms of rotation after-nystagmus—were exceedingly interesting, and he hoped to see the lecture preserved in permanent printed form.

Dr. George E. Davis congratulated Dr. Lewis on his ingenious model of the vestibular apparatus and his able discussion and demonstration of the vestibular functions. He agreed with what Dr. Kerrison had said about discussing the paper, as the subject was a very difficult one to conceive or follow. He could not understand why Dr. Lewis' apparatus did not demonstrate the mechanism of the functions of the vertical canals as taught in the Viennese clinics in a like manner as he claimed it demonstrated the mechanism of the functions of the horizontal canals as taught in the same clinics. It is a well recognized law that the momentum of the endolymph currents produce a more effective and a less effective reflex movement, depending on the direction of the currents, whether from the canal to the utricle or from the utricle to the canal. In the horizontal canals the more effective or preponderant movement or reflex occurs when the current is from the canal to the utricle; in the vertical canals the reverse is true. Now it matters not whether the two labyrinths are one organ, as Dr. Lewis contends, or whether they are separate organs and act in concert, in which latter view I agree with Dr. Kerrison, the above law still obtains and applies in the same measure to the vertical canals as to the horizontal canals. Furthermore, whether the anterior vertical canal of one side acts in concert with the posterior vertical canal of the opposite, or whether the two anterior vertical canals act consensually with the two posterior vertical canals, as I understand from Dr. Lewis' model and demonstration, the above spoken law, I believe, still holds and the Viennese teaching is rather confirmed than refuted.

Moreover, a careful study of the anatomic considerations underlying the physics of vestibulation and the function of the semicircular canals, inclines me to the belief that the maculæ of the utricle and saccule, and the ampullæ of the semicircular canals, are primarily receptive organs and correspond to the end sense organs of the cochlea in this respect. Therefore, if the function of the vestibular apparatus is de-

pendent on physical laws, the principles of its mechanism may be analyzed.

The peculiar arrangement of the labyrinthine sense organs in the cristæ ampullæ of the semicircular canals and in the maculæ of the utricle and saccule bears a basic relation to the mechanism of their physical reaction to stimuli. When we consider that the portion of the vestibular nerve which arises in Deiter's nucleus communicates fibers to the nuclei of the motor nerves of the eye muscles and to the motor nuclei of the spinal cord, we can understand that tonogenesis is due to stimulation of the central nuclei and that the function of the labyrinth is for the most part to receive and transmit said impulses, sensations or stimuli.

I may say that, also on account of anatomic consideration, it is a plausible theory that the maculæ of the utricle and saccule interpret motion and direction in straight lines, while the cristæ ampullæ interpret rotatory motion in the several directions of the planes of the semicircular canals in the three dimensions.

The chief sources of stimulation of the vestibular apparatus are motion and gravitation. Motion results from variation or position, and this change of position produces the variation in pressure, stress or impact of the endolymph currents on the cristæ ampullæ and the maculæ. This impact or stress causes pressure stimuli, which are received by the hair cells of the cristæ and the maculæ, which in turn convey them along the nerve fibers to the brain and spinal cord. Gravitation explains the source of constant pressure stimulation by the otoliths on the maculæ, which receive and conduct them thence to the brain, which in turn perceives them and exercises the necessary tonogenesis to maintain equilibration.

An analysis of the labyrinthine functions, based on physical laws, favors the argument that the major function of the vestibular apparatus is to receive and regulate tonus impulses which are conveyed thence to the central tonus nuclei where the tonus impulses are developed. Von Cyon goes so far as to say that the destruction of the labyrinths would not destroy muscle tonus, but would increase it by removing the natural inhibitory action, which he claims is one of the most important functions of the vestibular apparatus.

Shambaugh expresses an opposite opinion to von Cyon and

says he cannot accept the view that Deiter's nucleus possesses automatic tonus centers, but that the voluntary muscles are controlled by the tonus impulses from the labyrinth.

Between the extremes of the von Cyon and Shambaugh theories as to the origin and development of muscle tonus impulses and their influence on equilibration—or the adjustment of the individual to space orientation—or the recognition of that adjustment, I believe there is a middle ground.

DR. BERNARD SACHS said that he did not quite understand why he had been asked to speak on this topic, but was inclined to think that the chairman meant to show how a man could be made dizzy without rotation, by being compelled to listen to so much learning. As a neurologist, however, he would like to refer to one or two points in the paper. Dr. Lewis' presentation of the subject was extremely interesting; it was not difficult for the speaker to conceive of these two portions of the vestibular apparatus acting as one. It was of great value to have this subject presented so clearly as Dr. Lewis had done it. The vestibular apparatus is acquiring great importance just now, not only for the otologist but for others also, and this should be remembered by the otologist, for it is going to enlarge his own field of examination and research. The vestibular apparatus has not been insisted upon so far as a part of the statotonic apparatus. To this belong the entire skin of the body, the eye and the auditory organ; relations in space are determined by these three various senses, and the vestibular apparatus is an important contributing factor in this arrangement. The most important organ of the apparatus is not the labyrinth but the cerebellum, for all these paths are finally centered in the cerebellum, and the vestibular apparatus is one only of the three chief component parts of the larger apparatus ending in the cells of the cerebellum. There was one point which Dr. Lewis spoke of which the speaker would like particularly to commend—that was that the labyrinth should be regarded as one of the three important factors of the statotonic mechanism. It was perfectly true that disease of the labyrinth influences the status of the peripheral muscles; that was a point which the otologists should bear in mind, and so make a routine examination of the deep reflexes of the body and of the various muscles, as this would give much assistance.

The vestibular apparatus is only a part of the larger spinal and cerebellar apparatus, and very much the same symptoms result if any of the three parts of the huge mechanism is disturbed. The difficulties of diagnosis are increased by this. We have always supposed that hypotonus would go with purely cerebellar disease, and in cases where we found such affection or modification of the tonus we have always been ready to diagnosticate a central and not a peripheral lesion. Labyrinthine disease may be accompanied by hypotonus; and if so, the caloric tests must be depended upon to give a clue as to the actual site of the trouble.

Dr. Danziger said that he wished to take exception to the statement of the reader of the paper that we cannot test the function of one labyrinth. If we rotate the patient, we certainly set the endolymph of both labyrinths in motion, and the fluid will strike the hair cells of the crista, the ones of higher valency in the labyrinth toward which side we rotate, and the ones of lower valency in the other labyrinth. The sum total will give the intensity of the nystagmus. Supposing we turn first to one side and then to the other—the difference of the intensity of the nystagmus will show the functional change of one or the other labyrinth. For clinical purposes, we can, therefore, test either labyrinth for its functional state.

Dr. Strouse said that he wished to call attention to one point in regard to the falling of the patient. Dr. Lewis had said that the falling was not caused by the vestibular disturbance, but by the disturbance of the eye caused by the nystagmus, and the patient falls toward the slower complement. Dr. Strouse said that he could not reconcile that with the conditions as they exist, otherwise in horizontal nystagmus the patient would fall to one side or the other. If there is a vertical nystagmus, according to that he ought to fall backward or forward; and if there is a rotatory nystagmus, he ought to turn cartwheels to one side or the other.

Dr. Friesner said that he did not believe that the falling was due to the ocular impression; that, of course, could not be true, for the falling resulted from the reaction movements. These are distinct although not pure reflexes, and result from the stimulation of the vestibular apparatus. Moreover, the falling occurs even when the eyes are closed. He said, further, that he agreed with the others who had pre-

viously discussed Dr. Lewis' paper, that this theory could be discussed only after careful study and consideration. If, however, this theory depended upon the absolute parallelism of the corresponding canals, it must fall to the ground, since Schoenemann has shown, from the examination of some 500 or 600 corrosion specimens, that considerable differences exist between the two sides. These differences sometimes amount to twenty degrees.

Dr. Phillips said that the microscopic slides shown by Drs. Friesner and Braun were in the laboratory of the Manhattan Eye, Ear and Throat Hospital, and they would be very glad to show them to the members any Tuesday, Thursday, or Saturday afternoons. As to the remarks which had been made concerning the cases reported, he only wished to repeat that the cases had been presented from the histories without any comment.

He felt that he had just begun his study of these purulent conditions, and he hoped that the eighteen or twenty cases presented this evening would prompt some of the other members to report similar cases until two or three hundred were recorded. In only one of the cases which he had reported would he act differently, had he to do it over again. This was case 3 in his series, wherein he had performed operation early. In that he believed he should have done the radical and labyrinthine operation or should have let it alone.

All of these cases, with one exception, were complicated with acute purulent otitis media; every one was a chronic case. There may be a difference in treating chronic and acute cases.

Dr. Fowler said that the case mentioned by Dr. Kerrison was not healed, but was discharging posteriorly. Epidermatization had taken place only in the middle ear, so there was very good drainage. In regard to the diagnosis between suppurative and serous labyrinthitis, he would suggest to the members the use of a band around the neck, in order to congest the head. He hoped some day to tell the section of some experiments he had made with this expedient, as they were very interesting. It stands to reason that increase of pressure in the skull is bound to influence the pressure in the normal labyrinth; it also markedly affects tinnitus in many persons.

In some of these cases the tinnitus can be brought on or stopped at will by using this constriction band.

In acute suppurative disease of the static labyrinthitis (during the onset) the constricting band will markedly increase spontaneous nystagmus, whereas in the nonpurulent cases it appears to have little, if any, effect, or distinctly diminishes the nystagmus.

Tinnitus due to inflammation of the cochlea is increased or diminished, or unaffected, by a constricting neckband, depending on the ability of the band to increase, diminish, or not affect the iritating effect of the tissues responsible.

NEW YORK ACADEMY OF MEDICINE,

SECTION ON OTOLOGY.

Meeting of February 14, 1913.

Sinus Thrombosis Following Necrosis of the Periosteal Flap*

By Otto Glogau, M. D.

Traumatic Atresia of Auditory Canal With Mastoidal Complication.

By Ernest Danziger, M. D.,

Report of a Case of Paralysis of Abducens Nerve With Mastoid Complications.†

By Harold Hays, M. D.

Report of Removal of Fibroma Which Excluded the Auditory Canal.‡

By M. D. Lederman, M. D.

DISCUSSION.

Dr. Haskin, referring to Dr. Glogau's case, said that the doctor had spoken of Dr. Leland's flap. The speaker had seen that method used very successfully. Dr. Glogau had apparently neglected to consider the fact that he had exposed dura and sinus. No one doing mastoid surgery should ever attempt to put a flap of any kind on exposed dura. Dr. Glogau had also spoken of having opened the sinus and curetted the jugular bulb. That is a thing that is no longer spoken of, as it is very difficult to reach the bulb without a most extensive exenteration.

Dr. Leland especially states that in attempting to make use of his periosteal flap a complete exenteration of all diseased bone must be performed. Dr. Glogau admits that in opening his sinus he had to remove more of the bone. Three things might have caused the sloughing of the flap: First, not enough blood supply at the pedicle or too much

* See page 509. † See page 514. ‡ See page 431.

handling of the flap. Second, too light packing. Third, septic infection. If not misunderstood, the doctor says that the gangrenous flap had slipped down under the packing. With the pedicle attachment above, it is hard to see how such a thing could occur.

Referring to Dr. Lederman's case, Dr. Haskin stated that Dr. Sluder says he never does a tonsillotomy without having previously made a blood examination to determine the time of blood clotting. When it does not take place within a minute and a half, Dr. Sluder refuses to operate.

Dr. Cocks, referring to Dr. Lederman's case of hemophilia, said that it was always easy to criticise such cases after one is through with them, but that a case with a marked history of hemophilia should have been tested for coagulability before operating. In ear and throat surgery the practice of the general surgeons should be followed in this respect. In cases of jaundice they give blood serum subcutaneously or intravenously, and bring the blood up to normal before operating. If that had been done in this instance, Dr. Lederman would have been saved much trouble and anxiety.

Dr. Gruening said, in regard to the case of Dr. Hays, that the diagnosis of papillitis or optic neuritis should not be made in connection with some of the complications of purulent otitis. A true inflammation of the optic nerve or its head, an optic neuritis or a papillitis, only occurs when the aural disease is followed by meningitis. The diagnosis of optic neuritis would signify that the patient is beyond hope. What is really observed in many forms of otitis media and its complications is an edema of the papilla, the socalled choked disc. The fact that the edema disappears after the removal of the purulent focus, shows that it is not an inflammation.

Dr. Seymour Oppenheimer, referring to Dr. Haskin's quotation from Dr. Sluder, said that he had read the paper, and had wondered at the statement of Dr. Sluder's, that when he does not get coagulation within one and a half minutes he refuses to operate. It would seem to be a typographical error, for if he refused to operate under such conditions he would not operate often. It has been his own experience that it is quite within the limits of normality for coagulation not to take place within five or six minutes. In regard to

calcium lactate, in a series of cases in which he had used it and tested the coagulability both before and after its use, he did not find that the calcium lactate influenced the condition in a single instance. It is probably of value only in distinct hemophiliacs, and not with normal individuals.

DR. KENEFICK asked if he was correct in understanding that Dr. Lederman's patient was a female. That point was of interest, for it is stated in the books that females do not bleed, that they simply transmit the hemophiliac diathesis, and the male members of the family do the bleeding. Relying on the strength of that fact and concealing the family history, a physician recently had referred to him a young girl of about fifteen years of age, from whom he removed adenoids. Following the operation she had all the characteristics of a hemophiliac, and the bleeding could not be controlled until after the injection of 100 cc. of horse serum. It seems, therefore, that the statement that females do not possess the hemophiliac characteristics cannot be depended on.

DR. FELIX COHN said that in the discussion one of the gentlemen had referred to the coagulation test. It has been his practice for several years, since he has been making enucleations of the tonsils, to have the coagulation time taken in every case before operation. The enucleations were always performed under narcosis and only on hospital patients. The time of coagulation varied from four and a half to eight minutes, the average being about five to six minutes. The tests were made with a drop of blood on a slide, and the time taken for coagulation was carefully noted. The results have been uniformly excellent. It is a question, however, whether in the case referred to by Dr. Lederman, even a coagulation time test could have absolutely safeguarded the patient, inasmuch as there are cases of hemophilia where the coagulation time is not over prolonged, so that even the making of the coagulation test will not always guard the operator from the possibility of operating upon a hemophiliac.

DR. GLOGAU said that in operating on the case reported he had followed Dr. Leland's technic closely. The sinus at the first operation was evidently perfectly normal; the flap was put in the direction of the antrum, and care was taken to keep it away from the sinus. It was kept in place by gauze. It became necrotic by not being nourished properly. It was

not fair to claim that it was due to poor surgery, for the operation was performed lege artis and the sinus was normal before making the flap; besides special care was taken not to bring the flap into connection with the sinus. In regard to the criticism of what he had said about the curetting of the bulb, he might have been misunderstood. He simply said the sinus was curetted down towards the bulb. In the making of the flap he had followed Dr. Leland's directions very carefully.

Reply to Dr. Danziger, Dr. Glogau said: The jugular vein was thrombosed only to the entrance of the facial vein, and he was ligating below the latter. If the jugular vein would have had time to thrombose further down, the edema of the face might have occurred even without ligation of the jugular vein.

Exhibit of Dissected Temporal Bones.

DR. WILLIAM HENRY HASKIN: Diseases of the labyrinth have become well recognized of late and much is written about them. It seems to the writer as though a more thorough knowledge of the actual anatomy of the parts is one of the most important factors in undertaking any operative measures. To read many of the numerous articles, both in magazines and in books, it would appear to be a very simple thing to open the labyrinth and remove it according to Jansen's, Neumann's, Richards', and other methods, but the writer in presenting these fifty specimens desires to emphasize the difficulties attached to these operations and to warn against rashly undertaking them without a complete knowledge of the many relationships that one may encounter. This work should never be attempted save by those who actually know their anatomy and are prepared for emergencies.

It is well known that no two mastoids are ever exactly alike, but it is impossible to describe in writing the great differences in the bones; this knowledge can only be learned by carefully studying a series of specimens. It has been an invaluable experience to the writer to open each of the specimens presented. In these specimens the mastoids have been exenterated, and they show a great variety of forms, but one cannot appreciate the difficulties of cleaning them out unless he actually does the work himself. Some were composed of enormous cells throughout, extending into the zygoma (Nos.

96, 77, and 76), while others were dense throughout (Nos. 94, 73, and 72); and between these were all the varieties described by Mr. Arthur Cheatle before the International Otological Congress, in Boston, on August 12, 1912, and more besides.

In examining the specimens it would be well to do so systematically, for instance:

1. Shape of mastoid, depth, height and width.

2. Position, relation and direction of both the lateral sinus and the jugular fossa, which are colored with black ink and show many variations. Entire sinus and fossa lie in temporal bone in specimen D.

3. Facial canal. Size, relation to external semicircular; to posterior semicircular; to posterior wall of external auditory canal; to jugular fossa; to lateral sinus; note position of geniculate ganglion (Nos. 63, 110), from which chorda tympani passes back into the middle ear. Nerve is represented by strand of silkworm gut, the loop on petrous portion representing where the greater petrosal branch is given off. It is well to note how the nerve descends, in most cases, as far back as the middle of the external semicircular canal. Also note that it would be next to impossible to enter the tympanum from behind and under the nerve in many cases without opening the jugular fossa and destroying the nerves. (Nos. 66, 65, 63.)

4. Note variations in amount of space between sinus and fossa and the floor of the labyrinth. In several of the specimens large cells extend under the labyrinth to the internal auditory canal (Nos. 95, 107, 108), while in others the fossa reaches above the level of the lower end of the posterior semicircular canal. (Nos. 105, 106, 91, 92, 80, 81, 66, 65 and 63.)

5. Note how well these specimens bear out the conclusions of Schoeneman as to the inconstancy of the direction of the planes of the canals and the angles between them; for instance, it is very rare to find the external canal in a true horizontal plane.

6. The canals vary markedly in the size of the canals and of the arcs which they encircle. The superior and posterior vary greatly in their relation to the surface of the petrous portion of the bone, rarely being surrounded by cancellous

bone (Nos. 92 and 91), but generally forming part of the inner cranial wall.

7. The dense bony walls of the canals and the angle cannot be described, nor can they be appreciated by any one except by actual dissection. After cutting out all cellular tissue these semicircular canals were opened with dental burs, wherever possible to reach them, without taking down the auditory canal. This wall has been preserved in order to give the true idea of relations. In some the dense bone was almost one-third of an inch in thickness. In a few the upper bony angle has been cut away to show the interior of the labyrinth (Nos. 74 and 68), and several have had the ridge between the foramen ovale and the rotundum in the tympanum cut out with a small trephine, as advised by Hinsberg in his operation for opening the labyrinth. (Nos. 70, 118 and 119.)

8. Facial nerve. One specimen shows a large dehiscence between the tympanum and the jugular fossa which reaches well above the middle of the tympanum. (No. 64.)

9. Another specimen shows the facial canal in the anterior wall of the lateral sinus (No. 108), the sinus itself in contact with the labyrinth.

10. The position of the silkworm loop appears to the writer to be the probable point of infection in cases of temporosphenoidal abscess, especially when accompanied by facial paralysis occurring in the course of purulent otitis media. It is the point at which a bristle passed upward through the facial canal from stylomastoid foramen will always appear showing the direct path. To reach the internal auditory meatus it must be bent backward at right angles.

11. Shows sinus in contact with posterior wall of canal for one-half inch, with large cells above and below. The upper cortex over the antrum was very dense to a depth of half an inch. (No. 62.)

12. Nerve, bulb, sinus and geniculate fossa are very close in Nos. 63 and 117.

13. Lateral sinus forms part of basal cranial wall in its horizontal position.

It is unsatisfactory to have so little time for inspection of specimens at our section meetings, for such study is of very great value, but requires time. I would suggest that an entire evening be devoted to this subject, and that members

having collections be asked to have them on hand. It is very difficult for most of us to obtain bones, so that an opportunity to see a large collection would be of great value to all, but especially to those who have none. With the enlargement of our present building, it could probably be arranged to have a museum of anatomy if the members would present collections or even loan them to the academy. Such a collection would be of inestimable benefit to all generations and could be made a great credit to our profession, for we have very few anatomic exhibits in this city, that are ever heard of, at least, and it is very difficult for any one to study the many variations in anatomy.

These variations cannot be called abnormalities, as there is no such thing as a normal perfect bone, each one differing in some way from every other one.

Paper: The Enhancing of Auditory Acuity by Psychologic Methods.

By Wm. J. Maloney, M. D.

DISCUSSION.

Dr. Gruening said that he had been asked by the chairman to open the discussion of this paper, although he had not known its character beforehand. Of course the whole subject was largely academic. There was no record of any improvement in deafness by this method. Psychology can go hand in hand with medicine and pedagogy, and can give and derive valuable suggestions. Psychically deaf people are not often observed by the otologist. The psychiatrist may see them more frequently.

He was not willing to endorse the opinion that lip reading is harmful. On the contrary, he had found it a great aid in many cases. Very often when glasses are prescribed for people who are deaf, their hearing is much improved. The deaf who are proficient in lip reading often move in society with ease, and derive much happiness from the facility of their intercourse with other people.

To compare a deaf person with one condemned to solitary confinement is not logical. A person in solitary confinement does not see or hear anything; is dead to the world, dead to

himself. Psychologically there are variations in men: the optic and acoustic types. Some live with their ears and learn from what they hear; others see pictures of things, everything is visualized. A conversion from one type to the other is possible and usual. The deaf learn to see better, the blind to hear better than before.

The doctor closed by saying that although he disagreed with the writer of the paper in regard to lip reading, yet he had been very much interested in the paper, and had enjoyed it very much.

PROF. JOHN DUTTON WRIGHT said that he had been much interested in Dr. Maloney's paper. He had never yet found anything that was a universal panacea, anything that would work for every one in all cases. Many things are valuable in certain cases, and are useless in others. There was much truth in what Dr. Maloney had said, and there were elements of great value in his theory.

The chairman had doubtless invited him (Mr. Wright) to take part in this discussion on account of his being known as an educator of the deaf by the lip reading method, and perhaps expected that he would combat anything Dr. Maloney might say against lip reading. It would probably be found, however, if one got down to the basal facts, that he and Dr. Maloney were in perfect accord. He had always insisted that every faculty should be exercised to its greatest extent. He had taught that doctrine throughout his twenty-five years of association with deaf persons—that the possession of hearing, no matter how slight it might be, was their most valuable possession, and that every exertion should be made to use it to its greatest extent.

In his school there are many children who came supposedly totally deaf, and would indeed be deaf for all practical purposes, if allowed to pass their lives under ordinary conditions. In many instances, however, these children have been found to have a residuum of hearing, and the educative problem was how to make the most of that residuum. The greater problem, however, was how to develop the brain to understand the impressions received. You have to teach these children how to hear, and it can be done after three or four years of patient effort. Some one may then come along and remark on the wonderful change, and yet the perception of sound

may have been tested before and after the teaching, and found to be absolutely unchanged. The child has simply had its intelligence developed; the ability to interpret the imperfect sounds. He has acquired the intelligent interpretation of sounds into ideas, and apparently hears much better than before.

One will not be successful in teaching the lip reading process unless it is done as a means of getting ideas. Properly taught, the perception of what is said should be just as unconscious as that of the normally hearing person. These people are simply reaching for the thought that is conveyed, and they are ignorant of how to get at it. When a pupil says: "You speak too loud; I heard what you said," and when the teacher knows the range of hearing of that pupil and that he did not hear, the pupil should not be contradicted, for the ideas are coming to him through a new sense without his knowing it, and that is a great encouragement.

Dr. Maloney says that lip reading in those who are not totally deaf is a misfortune and is injurious; Dr. Gruening says it is not. Both are right. It is possible to teach lip reading in such a way as to do the person an injury. It is also possible to teach people lip reading and to preserve every vestige of hearing, and to teach them to make greater use of it. Partially deaf people do not hear everything that is going on around them. They miss a great deal of what is said, and they become indifferent; they become psychically deaf, just as Dr. Maloney has said. They do not pay attention to the sounds, for they do not get enough to catch the ideas, and so they become indifferent and give it up, and like any other organ that is unused, it becomes more and more atrophic, and the psychical deafness increases.

Twenty-five years of teaching lip reading has demonstrated that in teaching pupils one must first experiment with the pupil until the pitch is found where he is conscious of the voice, but cannot possibly understand what is said with the ears alone. Then for a considerable length of time, exactly that pitch of voice must be used which will enable the pupil to be just conscious of the voice, and he will strain every nerve to hear, and the result will be that the sense of hearing is quickened, and the mind rendered more alert, and although the vision does play a considerable part, yet the pupil learns

to divide his attention, and the auditory nerve gets a sufficient amount of attention, while the rest is left for the eye.

Lip reading so taught not only enables the pupil to know what is said, but it sharpens and awakens the sense of hearing which was slowly becoming dormant and neglected and running into psychic deafness, so that the person becomes mentally more alert and more interested, and pays more attention to sounds, etc., and gets more satisfaction from living. With a little sound and the help of the eye they can interpret speech without the intense strain which comes from trying to get it without the eye when the ear is imperfectly performing its functions. They say they feel happier, more buoyant, and their physical condition acts upon their mental condition, and the entire apparatus works better.

One thing Dr. Maloney said or inferred which does not seem quite true—that lip reading is the training of the eye. It has been pretty fully determined that the training of the eye is a very minor matter in lip reading. The eye practically performs its functions just as well at the beginning as at the end of this instruction. The pupils are taught to associate ideas with sequences of motion, just as we associate ideas with sequences of sound. It is not the training of the visual sense; it is the training of the power to put ideas with new impressions which have come to them. It is difficult for a normal person to realize the intensity of attention that is required to hear with imperfect apparatus. Most persons have had the experience of trying to hear with an imperfect telephone. If you can imagine your hearing apparatus to be as imperfect as that telephone, you can understand something of the energy that is required to relieve the ear by supplementing it with another organ. If you can relieve that strain you have given the person a fresh outlook upon life.

Mr. Wright further said that in connection with his official duties he had recently had occasion to examine a great many deaf children in schools for the deaf in the State of Massachusetts, and he wished to impress upon persons who have influence the necessity of giving more attention to the development of the hearing in these children, especially the young people in the schools. In every school, and in almost every class, he found children that had some capacity for hearing, the most valuable thing they possessed, which was being

ignored—and because it was inadequate they were psychically deaf. They were not physically deaf, in the sense of not being able to hear at all, but they were sufficiently deaf not to have any value or satisfaction from their imperfect hearing, and they ignored the sounds which came to them. Yet, if these children had the proper training, they could be developed into actively hearing people. More attention should be paid to the training of hearing in the schools for the deaf, for there are hundreds in those schools who are being trained as practically deafmutes.

Dr. Maloney was perfectly right in saying that it is desirable to develop the power of hearing to its utmost capacity. Dr. Gruening was perfectly right in saying that if one has not any hearing it cannot be developed; but there are certain fundamental principles which must be kept in mind. When you examine one of these deaf persons and make a chart, and block the islands of hearing which remain, you have to recognize the fact that unless these islands lie in the comparatively narrow range of the speaking voice they are practically worthless. Before the American Association to Promote the Teaching of Speech to the Deaf, Dr. Blake, of Boston, laid much stress on these islands of hearing, but said they were of no value for purposes of communication unless they were in the range of speech. If one wishes to get all around benefit, he must work upon those islands that do lie in the range of the speaking voice. It is the business of the teacher of lip reading to get people into communication with the world. If the island of hearing lies beyond the range of the voice, it will have to be supplemented in some way, and this method of lip reading is a vicarious way of doing it.

He then introduced Mrs. S., who said: "I am only a little hard of hearing, but my ear specialist advised me to take up the study of lip reading. I have not been under instruction long, but I have been surprised to find the effect that this mental effort has had upon my power of hearing. Not only do I understand people better already, but I find that I pay much more attention to the sounds around me. My maid has noticed and commented upon it. I was becoming indifferent and inattentive. I am now much more alert and interested. I listen more intently. I pay more attention to what is said and done around me. I find that I am already relieved

a great deal from the nervous strain of deafness. I am less anxious and nervous. I feel greater confidence in myself and therefore succeed better."

DR. E. W. SCRIPTURE said that the reader of the paper seemed to have confused several different kinds of deafness, and that he used the term "psychical deafness" to mean several different things. In the cases he especially described, namely, those who were hard of hearing, his suggestion to omit the direct method known as lip reading was contrary to the experience of all persons who had had any intimate acquaintance with the partially deaf, and also in defiance of the well known fact that the best way to develop the remains of hearing is to cultivate the sensations connected with speech.

DR. JAMES J. WALSH said that he was surprised that no one had yet recalled the fact that Urbantschitsch of Vienna had done something like this years ago, teaching children who had never heard and were said to be deaf, how to hear. In the course of a few weeks he taught a young person to listen and to hear. The main benefit, of course, was the confidence they get in going around the streets. These people after a while were sometimes able to hear even ordinary speech. The method employed was simply that of standing beside the patient and calling out one sound after another, noting the sounds that got to the ear, and gradually lowering the amount necessary until the attention was educated. In this way he taught them to pick up sounds that they could not pick up before. Dr. Walsh said that he was not so much interested in the otologic side of the subject as in its psychology. In the case of a gentleman who reads with his finger tips, the sense of feeling is so awakened and so keen, that he feels the difference in the letters. He has not had a bit of increase in the amount of sensitiveness, but he has learned to translate the little differences of feeling as they occur, so as to be able to read without any difficulty. Just exactly the same can be done to the eye with regard to lip reading. It is not the eye, it is not the acuity of vision, but the ability to translate impressions which it did not do before so as to get information just in that way. When Dr. Maloney had first spoken of this method, he had referred him to Urbantschitsch's work.

Dr. Walsh said that it had always seemed to him that in

the whole system of training one can take every sense and train it in any one. A remarkable instance of this is seen in Helen Keller, who has learned to listen with her finger tips. Most of us have learned to neglect the sense of feeling, and yet she has learned to hear with her finger tips. Can we not take any deficient sense, such as hearing, and train it so as to secure more hearing? Certainly Dr. Maloney's method of blinding the pupil so as to exclude the attention of the eye for a while in order to concentrate the attention upon the hearing was a valuable point.

Dr. Walsh said that he was with Fränkel in Paris when he was first teaching tabetics to walk by having them use their eyes. Dr. Maloney, on the other hand, has them shut their eyes and have them concentrate their attention on their muscle sense. He is applying Urbantschitsch's principle of cultivating attention, and we may look for some interesting results.

Dr. Kenefick said that it occurred to him while Dr. Maloney was reading his paper and bringing out the principles involved, that no mention was made of the time it takes to develop the fibers or sound tracts. It certainly seemed that the time required by Urbantschitsch to make a patient appreciate and repeat the syllable "oo," for instance, or "ee," while he shouted in his ear at the top of his voice at intervals from September until May or June, did not seem a very promising method of teaching the profoundly deaf. One young woman in the Vienna clinic was enabled by this method to hear three vowels during the year that he (Dr. Kenefick) was there as a student.

He had been delighted to hear Dr. Maloney's paper, but in comparison with lip reading, from which all have seen such excellent results, it would seem that for practical purposes lip reading has the advantage at present over the method so ably advocated here this evening.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOLOGY.

Meeting of March 14, 1913.

Report of Sixty-two Cases of Blood Clot Healing Subsequent to Mastoidectomy, Showing the Importance of Exposing and Curetting the Attic of the Middle Ear.

DR. HUGH BLACKWELL: The sixty-two cases here reported were undertaken with the view of shortening the duration of healing, lessening the pain of dressing, and improving the cosmetic result of mastoidectomy. The work extends over a period of four years. In about the first thirty of the cases, simple mastoidectomy was performed, and in the last thirty-two, in addition to the mastoid procedure, the attic of the middle ear was exposed and curetted free of infected tissue, without, of course, a disturbance of the ossicular chain.

This was performed by taking down the posterior canal wall to the epitympanic ring and removing the external attic wall, exposing the head of the malleus, body of the incus and its short process. At the conclusion of the operation a strip of iodoform gauze, folded once or twice, is laid down to the antrum and brought out at the inferior angle and the wound sutured down to within about the last one-half inch. A wet dressing of normal saline is then applied. In twenty-four or forty-eight hours the sutures are taken out, together with the posterior packing, which may or may not be replaced. Wet dressings are usually continued for the first week. The canal must be packed tightly at each dressing, and for about the first two weeks.

When the wound shows any tendency to suppurate, it is dried out and packed lightly with iodoform gauze.

Analysis of the sixty-two cases—Adults, 38; children, 14; babies, 10. Infection: Streptococcus, 12; staphylococcus, 3; streptococcus capsulatus, 3; pneumococcus, 2; mixed, 2; unknown, 38; negative, 1; known, 22. Healing duration:

Known, 50; unknown, 11. Perisinus epidural abscess, 19. Subperiosteal abscess, 22. Exposed sinus and dura, at conclusion of operation, 32. O. M. P. C. (2 still wet), 9. Complete B. C., 3. Complicated by subperiosteal abscess simulating furuncle, 3. Erysipelas, 3.

Of the sixty-two cases, thirty-eight were adults, fourteen children, and ten babies under one year of age; of the twenty-two known infections, twelve were streptococcus, three were streptococcus capsulatus. In adults healing took place in about twenty-one days; twenty-three of the cases being cured in less than that time, twenty after that time, five at the end of twenty-one days, and in fourteen the exact time of healing is unknown, but about corresponded in point of duration to the other cases.

Nineteen of the cases were epidural perisinus abscesses; twenty-two were complicated by subperiosteal inflammation or abscess; nine had a chronic discharge from the ear with little or no polypoid granulation tissue except in the attic, the hearing being good. Three of the cases were subperiosteal abscesses opening into the posterior wall of the external auditory canal, and were first diagnosed and treated as furuncles; in each instance they were complicated by a perisinus abscess. Three cases developed erysipelas; all mild cases, one of which was treated as erysipelas for only twenty-four hours. In both the other instances the wounds were doing well at the time of development of this complication, which first appeared some distance away on the face. Dura or sinus was exposed in thirty-two of the cases. None of the cases operated upon died, and in only one was there an operation for recurrence, which took place some two years after the primary operation.

In none of the cases reported has dislocation of an ossicle occurred during the operation.

Quantitative hearing tests have shown that the hearing was no more impaired in the thirty-two cases in which the attic was cleaned out than in the previous thirty. The external auditory canal does not collapse if it is packed snugly at each dressing. In one of the cases of chronic discharge, presented at the conclusion of the bone operation, a radical flap was cut from the canal and the posterior wound sutured, the wound being packed from the canal as in a Stacke operation,

no blood clot being used. The result was very gratifying, particularly from a functional standpoint.

Conclusions.—We believe that in a certain number of selected cases of O. M. P. C. with good hearing, presenting evidences of true attic suppuration only, this operation, either with or without a blood clot, or with or without a plastic meatal flap, will preserve the hearing and remove from the ear its potential possibilities of menace.

That when the procedure is employed the duration of healing after mastoidectomy will be materially shortened to within an average period of three weeks in adults. That the dressings are less painful and the convalescence more comfortable. Finally, that the subsequent scar is much less depressed.

DISCUSSION.

Dr. W. S. Bryant said that Dr. Blackwell's paper was upon a most important subject, and one in which he was deeply interested, and that he had watched with much satisfaction the favorable course of Dr. Blackwell's cases. In the later eighties Dr. Henry Lee Morse, Dr. Bryant's senior at the Massachusetts Charitable Eye and Ear Infirmary, gradually reduced the amount of packing in his mastoid wound until there was none. He at first thought it necessary to open the wound widely every day with a director. Later, noting that no pus escaped, Dr. Morse gradually discontinued this practice and finally left the wound alone to heal by first intention as soon as might be. Dr. Morse did not publish his technic and consequently it went unnoticed by the profession. In 1892 Dr. Blake of Boston and the late Dr. Sprague of Providence undertook the blood clot dressing. Dr. Sprague was at that time a general surgeon, had treated the long bones with blood clot dressing very successfully. Since 1892 various men have taken up the procedure in various parts of the country, some securing very good results. He himself has been doing it continuously.

One of the points emphasized by Dr. Blackwell was opening the attic and curetting the middle ear and the removal of all the affected tissue, as far as possible, without disturbing the ossicles. Dr. Blackwell's technic was somewhat similar to that described by Mr. Heath of London, but more like

the technic in a paper published by himself (Dr. Bryant) entitled "The Modified Radical Mastoid Operation."

The hearing is quite as good as if the middle ear had not been curetted at all. Dr. Bryant said that he had not thought it well to go as far as Dr. Blackwell had done as a routine, as the result is quite as satisfactory and can be obtained with less risk in most cases. It is quite possible to be a little overzealous in curetting, with the possibility of dislocating the hammer and anvil.

He congratulated Dr. Blackwell on the results of his work, for they certainly were most creditable.

Dr. Meierhof said that in this method another step forward has been made in the mastoid operation. If one recalls the first mastoid operations done by Schwartze, where a simple opening was made and the mastoid reached, and compares it with the work done today, the advance is impressive, though in those days they seemed to cure most of their patients. Later the operation was widened by a more extensive exposure of the cells, and a point was made of removing the tip, as the tip is often the site of the disease. Then came the removal of all the cells, especialy those around the sinus. Then it was found that the cells in the zygomatic root had to be removed, and still the patients did well. Now comes Dr. Blackwell with this procedure of going far forward into the antrum and exposing the attic horizontally, with no danger to the ossicles, which might ordinarily be supposed to injure the hearing.

Dr. Meierhof said that his experience with this method was very limited as compared with Dr. Blackwell's. Dr. Blackwell had assisted him in several operations, though he did not go so far as Dr. Blackwell advised, but contented himself with opening the mastoid and removing the cells and the tip, and going to the zygomatic arch. With this procedure his results had been very satisfactory as a rule, though in some instances he had been disappointed, as some of the patients had headaches which continued for some time after the closure of the wound. In some instances, also, the contents of the sac which was formed by the breaking down of the blood clot caused signs of tension, and he had been compelled to open up the sac. Still the patients did well and the wounds healed nicely. The leaving out of the packing was a

great gain, for the patients dread the dressing very much, especially the first time. He had had no secondaries, the hearing has been good, and the scars have been very shallow, instead of the old depressed scars. Dr. Blackwell was certainly to be congratulated on the results he had attained. Dr. Meierhof said that he was doubtful whether he would follow Dr. Blackwell's example in exposing the attic, in the simple mastoid operation, as he had not found it necessary.

Dr. Felix Cohn said that we must all be indebted to Dr. Blackwell for his presentation, exhibiting the results of primary closure of the mastoid wound in acute mastoiditis. It was not his intention to discuss the paper of Dr. Blackwell as much as to make a few brief remarks on the subject of primary closure of the mastoid wound, a subject which is at present one of the most interesting in otologic surgery. While the results of the socalled blood clot operation, as originally recommended by Dr. Blake, have not been entirely successful, and the reports of various surgeons have been so at variance, renewed interest in the subject was caused by the report of Dr. Holmes of his cases, at the last International Otological Congress held in Boston.

That a method of treatment of the mastoid wound which will more closely approximate the methods of the after-treatment of modern aseptic surgery in other parts of the body must appeal to all otologists is but natural. That it is also doubtless true that in a number of cases results can be surely obtained by primary closure, involving a principle of healing without drainage, must be assumed as absolutely certain, and the speaker himself has only recently operated on a patient with a nine weeks' acute staphylococcus purulent apex mastoiditis, in which after primary closure of the mastoid complete healing and drying of the mastoid wound occurred in sixteen days. In this case a drainage through the middle ear or the eustachian tube could be entirely eliminated, inasmuch as the apex cell was unusually large, invading the whole mastoid in a horizontal direction, and thus precluding all possibility of any drainage through the middle ear. We must therefore assume that in all cases of primary closure the gradual healing takes place by means of formation of organized granulation tissue.

Dr. Blackwell had laid special stress on the method of

operation, as, for instance, in exposing the incus or almost completely removing the posterior wall. The speaker did not believe that the successful results of primary closure were due to such changes in the technic of operation, for in the cases in which he has operated with primary and secondary closures, the mastoid was opened thoroughly in the usual manner employed in the cases which had been treated by the open method. Nor is the method of primary closure, in his opinion, dependent on the filling up of the cavity with blood, although theoretically any method which closes a bone cavity that is not filled, necessarily involves the filling up of the cavity with some blood and is, in a way, a blood clot, or modified blood clot method. On the contrary, in the cases in which Dr. Cohn has so far employed this method with good results, he has, after thoroughly flushing the mastoid cavity with a 1/6000 bichlorid solution, followed by normal saline, closed the skin wound under compression, without allowing the cavity to fill up with blood, making it a point to squeeze out as much of the sanguinary contents as possible, and then employing a compression bandage. A small cigarette drain is inserted and allowed to remain for two or three days.

Whether the method of closure should be employed in cases of very severe and extensive osteitis, in cases of perisinus abscess, or those of extensive exposure to the sinus or dura during operation, or in cases of mastoiditis due to measles, scarlet fever, etc., must still be left to future experience and to the judgment of the operator. Dr. Cohn stated that while so far he has not had the courage to apply the method extensively, after the experience reported by Dr. Blackwell, it was his opinion that the method of primary closure should be given greater scope, but with the reserve of informing all patients before operation that it might become necessary to reopen the wound and continue the treatment by the open method.

In cases of primary closure of chronic suppurative conditions, the argument has been advanced that in those cases we are not dealing entirely with primary closure, inasmuch as drainage is established through the auditory canal, and that those cases must, therefore, be eliminated from any statistics dealing with primary closure of the mastoid opening. It is possible that in a number of the acute cases operated upon by

Dr. Blackwell the question of some drainage through the canal or eustachian tube may have occurred.

DR. ARD said that he thought the method was more generally used than Dr. Blackwell anticipated before presenting the cases. For the last two years he had been using this method in Plainfield almost entirely—in at least forty cases, with the exception that in only a few cases was the granulation tissue removed from the attic. He follows the method described by Dr. Blackwell with the exception of going into the attic, and does not take down so much of the posterior wall and sews up all cases to the lower angle of the wall. The result is that after recovery there is a very much better canal —the cases also recover much sooner. Many cases have recovered in a little over two weeks—two of them in twelve days. Contrary to Dr. Blackwell's experience, some of the best results secured by Dr. Ard were with children—the dressings are much easier and the method is much more satisfactory in every way for both the patient and the physician.

He has had two cases of sinus thrombosis develop, but did not think the method was in any way responsible, as the process was probably going on at the time the mastoid operation was done. The method is far superior to the older method of open wound and packing. Possibly it is not suitable for all cases, but he had applied it in his cases, and the longest period of recovery was two and a half months, and only two of those. No secondary operation had been necessary during the past two years, and all recovered.

DR. KOPETZKY said that he presumed that Dr. Blackwell was operating upon acute cases—the report as read failed to specify; and if he was correct in this supposition, then there are certain points to be taken into consideration from the pathologic standpoint that were not considered when the method of Dr. Blackwell is critically examined. No issue could be raised with the brilliant results shown at the meeting, but the question as to the nature of the cases operated upon must be questioned, for that has an undoubted bearing, not only on the method advocated, but also on the pathology of acute mastoiditis as it is generally understood at this day. One is forced to the conclusion that there is either something wrong in the view of the pathology of acute mastoiditis as

we know it, or we must concede these cases to be of exceptional type.

In restating what all present probably know, it is to be remembered that the eustachian tube, the aditus ad antrum, and the antrum mastoideum are one continuous tubelike passage lined with mucous membrane. The antrum mastoideum is the backward projection of this passage. When the middle ear and the mastoid process becomes the seat of an acute infection, this whole passage is filled with purulent exudate, and the mucous membrane lining the mastoid antrum becomes very much swollen and thickened, and assumes an appearance of granular outline, very often mistaken for granulation tissue. Why continue the evisceration of this swollen tissue as far forward as Dr. Blackwell advocates? Why stop where he indicates? The remainder of the mucous membrane lining the rest of the tubal passage that was just referred to cannot be removed, and when in the usual procedure the mastoid process is cleansed of its purulent contents, all know that the mucous membrane returns to the normal; that is, the lining of the tympanic orifice of the eustachian tube and the lining membrane of the tympanic cavity become normal after the usual operation. Then why go so far forward in a painstaking effort to remove only a part of the general mucous lining of this region. No one heretofore has shown that it is the suppurating mucous membrane that is the essential factor demanding removal to effect a cure of an acute mastoiditis. Usually when this membrane is left in situ, and in the course of events recovery takes place, this mucous membrane becomes thinned and returns to the normal, just as the remainder of it must do, even under the technic advocated tonight, and then there exists less chances of subsequent recurrences, for men who have studied this question from the histologic side, have shown that when the membrane is removed under the mistaken idea that this constitutes one of the factors of the mastoiditis demanding removal, that there then is deposited in its stead, connective tissue, which often forms a funnel-like opening into the granulation tissue mass, which finally fills up the excavation, and this funnel leads the slightest accumulation of mucus from the middle ear into the granulation tissue in the excavated mastoid process, and is one of the prime factors in the formation of recurrences of secondary

infections in this partially organized tissue. This is particularly true when the subject of acute mastoiditis in childhood and infancy is thought of.

Finally, the operation as described tonight endangers the ossicles and their suspensory ligaments, and there seems no reason to assume the risk of impairing their functional activity. When the operation in the cases of acute mastoiditis is limited to the removal of the purulent detritus and all the accessible infected cells of the mastoid process, and the mucous membrane is relieved of the presence of the irritating masses of infected material surrounding and lying upon it, then no such risks are entailed, and, in addition, the return to health of the parts also means a return to conditions as nearly as possible to those in which they were prior to the onset of the infection; and this means much toward finally establishing normal hearing. Dr. Kopetzky, therefore, could not see the rationale of the procedure, and asked Dr. Blackwell to state what he considered the rationale of it to be.

Speaking of the bloodclot aftertreatment, he conceded that some men had had exceptional results, especially when they employed the method of technic devised by Christian Holmes. Reik, Sprague and Blake. He stated that he had tried to repeat the results that these men had obtained, having operated and treated a series of cases in a similar manner at the Manhattan Eye, Ear and Throat Hospital, but he could only say that his own results were uniformly unsuccessful, the majority of the cases either immediately breaking down, or soon coming to secondary operation.

Dr. Held said that he understood that Dr. Blackwell's idea was to hasten the process of healing and to avoid a posterior depression. Dr. Blackwell resorts to the primary bloodclot, and in addition chisels away a portion of the external attic wall. In reference to the primary bloodclot, Dr. Held opposes this method for several reasons, as follows: the fear of closing up an abscess cavity with bloodclot when it is practically impossible to render aseptic a wound so thoroughly septic; that we have in the closed cavity ideal conditions for the growth of bacteria and the spread of infection: heat, moisture, a good culture medium, and the bacteria present; that there might be inclosed in the cavity microscopic particles of infected material; that with a virulent infection

and a suppurating middle ear and mastoid cavity, more drainage for a reasonable time should be had than from the incision in the middle ear alone, and that the posterior wound creates a counter opening.

As to the chiseling away and curetting of the external attic wall, Dr. Blackwell advocates going in between the superior and external ligaments of the malleus. Working in such a confined and small space, even with the best of technic, would very frequently result in damage to the ossicular chain. Dr. Held cannot reason the necessity for attacking the external attic wall in a case of acute mastoiditis.

He recognizes the advantages that would be gained by any form of aftertreatment which would shorten the long period of convalescence, and has been using the secondary bloodclot in acute mastoid cases, but only after the suppuration in the tympanic cavity had practically ceased. In this method the objections enumerated before to the primary bloodclot have been overcome. He believes that it is a very risky procedure to risk a patient's subsequent hearing for the sake of shortening the aftertreatment, when such aftertreatment can be shortened without any risks either to the patient's hearing or to his welfare.

Dr. Seymour Oppenheimer said that there evidently was no general agreement as to the preferred type of operation, and that Dr. Kopetzky had struck a keynote in asking for the reason of the recurrences. There is a question still as to whether the procedure of vigorously curetting the antrum is not the responsible factor for a number of recurrences, by causing an alteration of certain histologic structures, predisposing to subsequent infection.

Dr. M. D. Lederman said that the cases presented by Dr. Blackwell showed the excellent results he claimed. At the last meeting of the International Congress on Otology at Boston, the question of leaving undisturbed the tissues of the middle ear was discussed. Mr. Heath, of London, had emphasized this point.

For the last two years he himself had been following the technic suggested by Dr. Blackwell, without, however, curetting the granulations in the middle ear. The entire wound is closed, a cigarette drain being introduced in the lower angle, which is removed after the third or fourth day. The cases

have all acted very nicely. The return of the hearing and the reformation of the membrane had exceeded his expectation. If that much can be accomplished through curettage of the mastoid cells and by simple drainage, without invading the middle ear, we should avoid the danger of disturbing the ossicular chain. He had not removed more than half the posterior wall of the bony meatus after removing the diseased cells; this was done for the purpose of allowing the canal wall to fall backwards. He was not inclined to go further than simple drainage. He inquired whether Dr. Blackwell attempts to cleanse out the cavity at his first dressing, or introduces another drainage tube. Another factor was the treatment of the wound at the time of operation. One is apt to use antiseptics which may interfere with the activity of the tissue. He was accustomed to use only a simple saline solution as a cleanser, and that may be an element in the healing of the wound, this permitting the tissue to return to its normal function without disturbing it by too heroic methods.

Dr. Kerrison said that he had been very much interested in the paper and in the discussion. He would not attempt to discuss the technic described by Dr. Blackwell, as he had not the personal knowledge of it which such a discussion calls for. It seemed to him, however, that such a presentation of the subject should be considered from the clinical standpoint, i. e., in the light of the reported results. The paper had in the first place the merit of honesty. Dr. Blackwell had not claimed uniformly brilliant results. He had stated that in some cases the period of postoperative repair or healing had been by no means unusual. He had also warned against the danger of a collapsed canal, if the surgeon neglected to pack the auditory canal firmly—a danger which would seem to be greater in this than in the older method of operating.

Dr. Kerrison said that as a colleague of Dr. Blackwell in the Manhattan Eye and Ear Hospital, he had been able to see some of the results of the cases reported very shortly after they were operated upon, and had been impressed with the rapid repair both of the drum membrane and of the postauricular wound. As a very straightforward report, based on actual experience, he regarded the paper as a valuable contribution to the subject.

DR. BLACKWELL, referring to what Dr. Cohn had said about drainage from the canal, even when the first dressing was removed the canal packing was usually absolutely dry. Occasionally there was some moisture, but the second dressing nearly always showed that there was very little infection remaining in the middle ear after the operation. Sometimes the canal drained for two or three days, or perhaps a week; but it was usually dry at the first or second dressing. In one of the O. M. P. C. cases there is still some canal drainage.

As to the cases referred to by Dr. Ard, in which the mucous membrane grows out of the middle ear into the mastoid, he had seen such cases and believed that it happened because after a thorough operation the cases had been packed tightly, especially the antrum. If the attic is curetted and the packing omitted, this complication will not occur. He believed that if any of these cases had been packed tightly in the posterior wound the healing would have been greatly delayed, beyond even the normal time.

Dr. Kopetzky had inquired concerning the rationale of taking out the antrum and attic tissue in acute cases. The paper is a purely clinical one, and the tissue had been removed for no other reason than that the subsequent results were good. That seemed a sufficient reason. When the infection is removed so far as possible from the mastoid and attic, the best that can be accomplished for the patients has been secured.

Dr. Held had spoken of the danger of closing an abscess cavity. From a macroscopic standpoint, at the conclusion of the operation these cavities were absolutely clean. We cannot remove microscopic evidences of the disease, but it would seem from these cases that the patient could take care of what remained. That was what was discovered in doing the work. He had not had any recurrences where the attic had been cleaned out.

Demonstration of the Strobilion, an Apparatus for Controlling the Voices of Singers and for Teaching the Deaf to Sing.

DR. E. W. SCRIPTURE demonstrated an apparatus which he had invented and called the "Strobilion," which is used for controlling the voices of singers and for teaching the deaf to sing. He said that the idea was derived from an apparatus

of his, described in 1896 in the Studies from the Yale Psychological Laboratory. A disc, fixed on the axle of an electric motor whose speed can be regulated by a rheostat, is divided into fifteen rings of alternating black and white spaces. The number of black spaces in each ring corresponds to the relations of vibrations in the diatonic scale. The inner ring has eight spaces; the next, nine; and so on. When the motor is going, the disc revolves and its entire surface appears an even gray. In front of the disc there is a scale marked with the syllables do, re, mi, etc. The disc is illuminated by a small flame from a flame box supplied by acetylene. When a tone is sung into the mouthpiece of the flame box, the flame vibrates and the disc is illuminated as many times a second as there are vibrations in the tone sung. Between these illuminations there is darkness. If the black spaces of any ring of the disc are passing a fixed point at a rate equal to the number of vibrations of the tone, that ring will split up into a series of black and white spaces that appears to stand still. All of the other rings will remain gray.

The deaf pupil is required to produce a tone that will make a certain one of the rings stand still. If the pupil sings a tone that nearly hits, but not exactly corresponds to a certain ring, that ring will split up into spaces, but instead of standing still it will appear to revolve forward or backward. If the tone sung is too sharp, it travels backward; if too flat, then forward. If the error is small, it travels slowly; if large, then rapidly. In this manner the deaf pupil can be taught all the notes of two octaves.

After the deaf mute has learned to sing, he can readily be taught to modulate his voice musically in speaking. The harsh monotonous voices of the deaf mutes are replaced by pleasant ones. Since each minute variation of pitch is rendered visible to the eye, the strobilion is also used for training singers to regulate the pitch of their voices accurately.

DISCUSSION.

Dr. Harris Taylor (principal of the New York Institution for the Improved Instruction of Deaf Mutes and Others) said teachers of the deaf were entirely unlike physicians, inasmuch as when the latter were told that any one had found a cure for any disease, his word was accepted at once (??),

whereas the teacher of the deaf, when told that some one had found a means of controlling pitch in a deaf child, did not take it very seriously, but required to have it demonstrated. Quite a while ago, Dr. Scripture had written to him that he had found a means whereby a deaf child could be taught to control pitch. He had seen others who had exhibited limited enthusiasm on the subject and were interested, but did not believe that it could be done. What had just been demonstrated was evidence that a person can see whether or not his voice is going high or low. At first he had seen this work theoretically, and it seemed that it ought to work. The next thing was to try it with deaf pupils. He had sent to Dr. Scripture the worst deaf children that he had, on the theory that it could not do them any harm. Nearly all of them were cases of offensively high pitch, and no success had been secured toward improving them, and yet the results from the aid of this instrument were very gratifying indeed. One girl who had an abnormally high pitch had been with them for four or five years, and no change had been made in her pitch; her voice was almost a screech, yet with this instrument Dr. Scripture had been able to guide her voice up and down and to maintain such a pitch within her compass as he desired. She had been under Dr. Scripture's training for only a very short time, and she is now speaking several tones lower in her ordinary speech. This is a very important feature in teaching the deaf to speak. Very often their speech is very offensive; a great robust boy has a voice which goes up and down, and a nice little girl may have a deep, low voice. It jars on one's sensibilities, even if one understands what is said. Dr. Scripture is doing a great deal for the children who have been sent to him. The influence is noticed in their speech even after one week, and the progress is noticeable. It can be demonstrated by watching them. Some of them can be taught to control pitch a great deal better than some normal persons. Dr. Taylor said that he could not speak too enthusiastically of the influence which this apparatus can have on the voices of the deaf, making them more natural and more easy to understand, as well as more musical in their speech.

DR. W. HALLOCK (Columbia University): I wish to express my appreciation of the opportunity of being here. I

am only troubled with the thought that if I should undertake to mention all the things this apparatus could be used for, many of you would want to go home before I got through. Like many other discoveries, it seems wonderful that it has not been thought of before. It is a simple and ingenious method of doing what we have been trying to do in such complicated ways. If you go to a moving picture show you may note that in a scene which shows wheels with spokes the exposure of the shutters of the kinetescope is not the same as the movement of the spokes of the wheel, and the wheels appear to turn slowly either way. If the rates are the same the wheel will appear stationary. One day I got all ready for a terrible accident on the railroad, for I saw the wheels of the rapidly moving truck were standing still; but nothing happened; the train went on smoothly—and then I recognized that I was looking through a picket fence.

I have had a good deal of experience one way and another with these things. I was fortunate enough a good many years ago to see and hear a patient who had had his whole larynx taken out and could talk perfectly well, but in an absolute monotone. Then I was very much interested in the control of pitch in the deaf, for some years ago I had occasion to make some experiments with Miss Keller, who carries her pitch very well by putting her fingers on the control larynx. As long as she has her fingers on that she does very well, but if the control stops, she loses her control.

The possibilities of this instrument are way beyond what Dr. Scripture has suggested. The whole community ought to raise a monument to any one who will do anything to keep singers on the pitch. They cannot tell half of the time by their own ears whether or not they are on the pitch. This will give them a means of doing that.

Another thing that it is available for and very valuable: many singers sing and you cannot tell whether or not they are on the pitch, for the pitch tone is almost lost in the high notes and overtones. Suppose, for instance, you take off the present disc of two octaves and put on the fundamental and first seven overtones; you can change the fundamental by changing the range. A man sings bass C; in most of them you will get very little bass C. Many times you get the overtones, and the person who sings ought to be able to get the fundamental.

Some of them, I know, are anxious to have some way of finding out whether they get the fundamental or not. They can tell themselves with this device. It seems to me that it is going to be very valuable in that way. Of course, a person has to have some practice, and you must look out for enhanced resonance, but that is easily overcome. Possibly the uncertainty in the tremolo or the inability to hold the pitch steady is due to our own inability to give an even pressure of air, either in our own voice or blowing in the pipe. It is almost impossible to blow with a perfectly uniform pressure, and if you change the pressure you change the pitch in almost any wind instrument. I tried to notice when the experiments were being made whether it had anything to do with the pulse beat. If you watch the wheels of an automobile, the wheels will seem to stop for an instant. Count your pulse, and you will find that the stop is every pulse beat. When the blood is forced into the retina there is a momentary blur.

It must be a very valuable thing to the deaf and to the teachers of the deaf, for it is right there. There are no reductions or calculations. The person sees the whole thing. I am very enthusiastic about it, and congratulate Dr. Scripture most sincerely.

An Improved Method of Eliciting Rotation After-Nystagmus.

Dr. Edmund Prince Fowler: It is generally accepted as a fact that because of the manifest impossibility of rotating one labyrinth without its fellow, it is also a fact that it is impossible to separately test by rotation one labyrinth unless the opposite be diseased or dead, and even in these cases conclusions can be definite only in certain cases.

I will endeavor to convince you that by my proposed method of rotation it is possible, both theoretically and practically, to separately test the labyrinths of either side, whether one or both be in health or disease. I realize the intricacies and difficulties of labyrinth physiology and pathology and the many arguments which can be brought forward to combat my ideas. Partly for that reason, partly because I have not had sufficient experience with this new method to state definitely some of my observations, and mainly because I believe it will be better to first present my simple arguments, I bring forward

at this time the tests in relation only to the horizontal semicircular canals. However, these being true, it is self-evident that it is possible to apply the principles to each and every canal in the two labyrinths.

I will state my basic facts and arguments in as simple words as I am capable of using, that those not familiar with the hydromechanics of the canal systems may readily follow my brief argument.

If both normal horizontal semicircular canals (referred to herein simply as canals) are revolved in a horizontal plane, and about a center equidistant from each, the effects of equal rotations to the right or to the left will be equal; the nearer the common center of rotation is approached, the greater become the effects following rotation; and the farther it is removed from the canals, the less are the effects.

One canal being destroyed, the remaining canal will be affected more or less, depending upon its nearness to, or distance from the center of rotation; and if the axis of this center be within the circumference of the canal, the greatest possible effect will be obtained.

If two canals are placed on the same radius of rotation, the centripetal will be nearer the common center of rotation by a distance equal to its distance from the centrifugally placed canal; one canal will, therefore, be subjected to greater effects following rotation than its mate.

The nearer to the center the inner canal is placed, the greater will be the differences between the effects upon the two canals during and following rotations.

If both canals are equally normal, it is obvious that the results following rotations to the right or to the left will be equal, unless the direction of the fluid flow makes for a difference—which I may here state it tends to do; but I will not go into this factor at this time, as it complicates, though aiding, my argument for the use of tests here brought forth.

The results will be practically equal also whether the right or the left canal is centripetally or centrifugally placed, if they are accurately so placed and maintained.

If one canal is diseased, what happens? The results will differ, not only (in certain stages of labyrinthitis) as between right and left rotations, but also as between central and distal placement of the functionating canal. For instance, let us

assume that the left canal is dead. Following the usual method of rotation, we may, or we may not, obtain sufficient differences in the duration of the nystagmus following right and left rotation to enable us to make a diagnosis. Following right and left rotation, with the radius of rotation passing through the two canals, may likewise lead to doubtful results, following rotation, say, with the left canal peripheral; but turn the head on its own axis through 180 degrees, and thus bring the right canal peripheral (or move the head laterally to the right of the center of rotation); the right canal will now be in a position further from the center by approximately 80 mm., and though the differences in the nystagmus between right and left rotations be unsatisfactory, yet the duration of these eye movements will be less than those obtained when the healthy right labyrinth was tested nearer to the rotation center. By first rotating with both canals at given and equal distances from the axis of rotation, and then placing one canal at this same position and the other farther out on the common radius of rotation, it is apparent that we have a means of testing both canals, first together, and then separately.

It so happens that the labyrinth is about one and a half inches from the side of the head about the external auditory meatus, and also one and a half inches from a point midway between the two labyrinths. If, therefore, we rest the head against a support placed about the ear and on the axis of rotation of a revolving chair, one of the two labyrinths will be placed one and one-half inches, and the other four and one-half inches from the axis of rotation.

If we fix the head between two supports, one of which surrounds each pinna, so that the midpoint between the labyrinths coincides with the axis of rotation, both canals will be about one and a half inches from the axis of rotation.

Hence, in the lateral positions, one canal—and only one—will be one and one-half inches distant from the common axis of rotation, or exactly in the same position relative to the axis as it was during the position with the axis midway between the two canals.

Of course, the position of the ampulla of the centripetally placed canal is changed relatively—being in the first instance

centripetally, and in the second instance centrifugally placed in relation to its canal.

There is one drawback to my method, namely, if I rotate ten times in twenty seconds, I may cause excessive stimulation of the centers and bring on nausea and vomiting. But I find it is not necessary to rotate ten times in twenty seconds. In fact, fewer rotations give more accurate results, mainly because they occasion less nervous excitement and less shock to the canals.

A little later I will go into this subject more at length and submit the technical calculations which have been made at my request by competent engineers. These prove mathematically what I have proved experimentally and clinically.

The chairs now used for the rotation tests are so constructed that the labyrinths take a position five or six inches from the rotation center. This is one reason for bad results, as any movement of the patient's head varies the distance of each labyrinth from the center of rotation a double amount, because if one side moves backward and away from, the other moves forward and towards the center of rotation.

DISCUSSION.

Dr. Hallock said that he did not know anything about nystagmus, but was very much interested in the presentation of the subject, as he has occasion to lecture about the acoustics of the ear. The semicircular canals are pretty near by, and some one is pretty sure to ask what they are for. He wished to add his opinion as that of an hydraulic engineer to say that the mechanics of the case as Dr. Fowler had presented them were entirely correct.

Dr. Friesner said that the method presented by Dr. Fowler was exceedingly ingenious, as were most of the things which he invented. When, for purposes of comparison, we apply any test to both labyrinths, or attempt to apply the same mechanical force to both labyrinths, we must take the utmost pains to see that the irritation is applied equally and simultaneously. In the old method of rotating for testing the external or horizontal semicircular canals, we so fix the head that both labyrinths bear such relation to the axis of rotation that the mechanical force engendered acts upon them both

equally and simultaneously. One serious objection that this method seems to present is that in shifting the head we may not apply the same force to both labyrinths and, therefore, even though we do get differences in the after-nystagmus, these differences may be due at times to errors that slip in through misplacing the head, through inaccurately placing the two labyrinths with relation to the axis of rotation.

DR. FOWLER said he would show that what Dr. Friesner called the older method, but which he would refer to as the present method of rotation, was at a mechanical disadvantage and therefore less accurate than the method introduced this evening. In the author's method, the head is so placed that the two canals are resting on the same radius of rotation, but in this older way, the accepted way, the canals are on separate or opposite radii of rotation. As a matter of fact, in all the chairs that he had examined, the head rest is eight or nine inches back of the center of rotation. Now what happens? The slightest change of one labyrinth backward or forward makes the same amount of change in the opposite labyrinth, but in the opposite direction, and hence the error is doubled; whereas, if the head is placed with the labyrinths on the same radius, even considerable movements make no appreciable difference in the distances the labyrinths are from the axis of rotation, and consequently only very slightly affects the duration of the after-nystagmus. It is readily seen that the proposed method of rotation may shed much light upon several interesting points in labyrinth physiology and pathology. A fortunate circumstance is the fact that his tests depend not wholly upon the accuracy of his reasoning, but simply upon the acknowledged fact that the effects of rotating any body vary with its distance from the axis of rotation.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of December 17, 1912.

THE PRESIDENT, DR. JOSEPH C. BECK, PRESIDING.

PRESENTATION OF CASES.

DR. CHARLES H. LONG reported a case of

Atresia of the External Auditory Meatus Due to Furunculosis,

of which a detailed report will be given at a subsequent meeting.

Nasal Tuberculosis—Recovery.

DR. OTTO T. FREER reported the case of a woman, aged 59, first seen on May 28, 1912. At that time the affection had existed for five years. The symptoms consisted of nasal stoppage, with complete obstruction of the right nostril and partial closure of the left. Scabs formed upon the septum and were cast off and reproduced. In 1910, as the result of an examination of microtome sections in the laboratory of the University of Virginia, the condition was declared nasal tuberculosis. The nose was then repeatedly cauterized and the disease seemed checked, until the symptoms returned in March, 1911. The diseased area was again cauterized with nitric acid and the galvanocautery, and a perforation formed in the septum.

Examination of the patient showed exuberant granulations upon both sides of the cartilaginous septum, these granulations nearly filling a perforation which lay about one-half inch above the nasal floor and in a vertical line with the anterior nasal spine. The anterior inferior part of the septal cartilage was softened so that the nasal tip could be readily depressed with the finger. Following the alar cartilage, granulations lined the external nostrils. There was a granulating area which covered the anterior end of the right inferior turbinate and an area of the septum opposite it.

On account of the involvement of the external nose, the condition seemed inoperable without great disfigurement, so the patient was referred to Dr. Adolph Hartung for X-ray treatment twice a week. A specimen was also excised from the border of the perforation and declared by Dr. Maximilian Herzog to be tubercular. Under the influence of the X-ray the granulations disappeared from the external nares and from the perforation in the septum, and the softening of the cartilage ceased to progress. The granulating areas upon the inferior turbinate and the septum further back were not influenced, however, because of their depth in the nose, so that on June 8, 1912, the right inferior turbinated body, which was tubercular throughout and was softened into a mass of spongy granulations, was extirpated, while the area opposite it upon the septum was cut away to the bare cartilage and bone. Healing took place rapidly, and at the present day, December 23d, all evidence of disease has disappeared from the nose.

The history of this patient shows that an inoperable case of nasal tuberculosis may be brought into a condition where operation is possible by the use of the X-ray. Its effect in this case confirms the experimental findings of Professor Brünings, of Jena, who proved, after producing inoculation tuberculosis in the larynges of animals, that the X-ray is more effective in the treatment of local tuberculosis than intense light.

Dr. Freer also referred to a case of nasal tuberculosis in which he had extirpated the entire ethmoid labyrinth upon the right side, the right middle turbinate, a large portion of the covering of the septum upon the right side, and a tubercular tumor from the posterior border of the vomer in 1907, the patient making a complete recovery. (This case was reported in the ANNALS OF OTOLOGY, RHINOLOGY AND LARYNGOLOGY, March, 1910.)

Total Resection of Superior Maxilla for Carcinoma.

DR. JOSEPH C. BECK presented a fresh specimen of a case of total resection of the superior maxilla for carcinoma, beginning several months ago as an epulis. The patient was a man, 44 years old, otherwise in a healthy condition; there were no glands in the neck as yet infected with cancer. Preliminary exposure and compression of the external carotid

artery was performed. The typical Langenbeck operation, with few modifications, as curettement of the ethmoid cells, was carried out. The anesthetic was ether by vapor, carried down into the larynx. There was very little bleeding present. A large defect of the cheek remained, owing to carcinomatous involvement of this structure. The patient was returned to bed in good condition. The gross specimen shows clearly on section the presence of carcinoma, and a previously excised piece on microscopic examination also proves it to be an alveolar carcinoma.

The point Dr. Beck wished to make was that all these carcinomata should be operated upon, especially so long as a patient is in good general condition, and especially if the glands in the region are not metastatically involved, and if they are, they should be removed en masse. The mortality is great, recurrences frequently occurring, but if only one case in every twenty-five is saved, it may be said to be a percentage of one hundred, since without operation they all die.

Technic and After-Treatment of Resection of the Septum Without Packing.

LOUIS OSTROM, M. D.,

ROCK ISLAND.

The author prefers to have the patient sitting up during the operation. There is less bleeding, and the patient can assist in blowing his nose, etc. He is less fatigued with the patient upright than when operating with the patient in the recumbent position, and the position seems more natural. The average time required for the operation is forty-five minutes, including preparative operation and immediate after-care. Many cases have been completed in fifteen minutes; some few cases have taken two hours.

Time of Operation.—Usually between seven and nine a. m., so that patient may have a full meal in his stomach; the general effect of the cocain is less disagreeable, and if anything should arise demanding our attention, all day is at our disposal.

Anesthesia.—Flake cocain is used alone, applied three or four times in small quantities, until the tolerance of the pa-

tient becomes manifest. When the patient is fully anesthetized and not sick from the cocain, and everything ready for the operation, adrenalin is used. In all his experience he has had practically no bleeding during the greater part of the operation, unless adrenalin was used too early. It takes a little longer to get started, but saves time in the end.

Technic.—The primary incision is made about vertical, one-third to one-half inch long, pointing down toward the middle of the incisor crest. This primary incision in the mucous membrane is made at right angles to the surface. The elevation of the mucous membrane is made by first scraping or pushing the perichondrium from the cartilage, so that the cartilage is distinctly visible within the primary incision. The mucous membrane is then elevated backwards above the vomerian crest and up to the upper border of the deflection. With his right-angled elevator (made for him by Ermold, of New York, in 1903) he elevates the mucous membrane up to the roof of the nose below the bridge, and forward to the primary incision. The primary incision is then extended upwards to near the roof of the nose, then down to the incisor crest and out about one-eighth inch across the floor of the nose down to the bone (Yankauer). The periosteum above, below and over Jacobson's cartilage is separated from the bone and cartilage with Stevens' dull pointed tenotomy scissors bent on the flat, the points of which hug the bone and cartilage and cut the fibrous tissue connecting the periosteum to the sutures at the incisor crest in the region of Jacobson's cartilage. This dissection with Stevens' scissors is continued backwards to the posterior end of the incisor crest, when a dull, narrow elevator can elevate the mucous membrane on the floor of the nose adjacent to the septum, then upwards on the septum up to angle of deflection on to vomerian crest. The mucous membrane over the crest or ridge, or spine, is then elevated from behind forwards, or this process is left until the bony septum is cut above and below. The edge of a sharp ridge can be cut off with Stevens' scissors and left adherent to the mucous membrane, thus avoiding tedious dissection and possible perforation.

The incision in the cartilage is about one-sixteenth inch back of the incision in the mucous membrane, but in the same general direction, but at an angle of forty-five degrees to the

plane of the septum, and only about one-quarter to one-third inch long. One finger is placed in the opposite nostril behind the incision, and pushes on deflection so that the incision in the cartilage gapes.

The point of a blunt-pointed elevator with the tip bent on the flat is pushed into the incision of the cartilage, and while pushing against the cartilage anterior to the incision with the bend or heel of the elevator the tip is directed against or toward the cartilage of the septum (never against or toward the mucous membrane), and as soon as the tip of the elevator disappears from view, the finger in the concave nostril feels the elevation. At this point ocular inspection must take place, to be sure that the septum was not perforated, cut or torn. The elevator is then pushed backward, elevating the mucous membrane backwards, up and down as much as it can. The author's right-angled elevator is then used to elevate the mucous membrane from behind forwards, first above, then below, down to the floor of the nose. The incision in the cartilage is then prolonged upward to one-quarter inch from the bridge of the nose, and downwards to the crest. Remembering that the fibers connecting the vomerian sutures to the periosteum and perichondrium run out and back, by pulling forward these fibers guide the instrument in against the bone, and no matter how scarred or adherent or grooved the concavity of the septum may be, the right-angled elevator separates the mucous membrane from the bone and sutures, away down to the floor of the nose, as far forwards as the anterior end of the incisor crest, with no likelihood of perforation.

Ballenger's swivel knife is used to cut the cartilage above, accurately guiding it to cut upwards parallel to the bridge of the nose, one-third inch from the upper border of cartilage of septum or bridge of nose. The rest of the cartilage is removed in one sweep. The bony septum is removed with Killian, Grünwald, or any other forceps or punches which one may prefer. The maxillary crest is removed with gouge, chisel or punches.

Usually two black silk sutures are placed in the mucous membrane, one in the middle and one at the angle on the floor. A plug of cotton dipped in paraffin-vaselin is placed over the incision. This can be removed and renewed as desired.

CONCLUSIONS.

1. Hematoma does not occur if there is free drainage, and all blood will escape from septum in two to five days, usually after the third day.

2. In case of infection, drainage is already prepared for. He has had no infection of the septum.

3. Hemorrhage cannot take place unless the mucous membrane is so mutilated that an open wound is produced.

4. Packing cannot be placed uniformly on the septum; usually the upper one-half or one-third is never packed. (His observation at all clinics, and numerous operators.)

5. Pain follows removal of packing.

6 Hemorrhage may take place when packing is removed, compelling repacking.

7. General sinus infection and severe pain usually follow packing.

8. Mucous membrane of turbinates may be injured by pressure from packing, and especially on its removal.

9. Hematoma often occurs after removal of packing.

DISCUSSION.

Dr. E. Fletcher Ingals is not in sympathy with removing so much of the septum as is usually done. If bone and cartilage were not needed, they would not have grown there in the beginning. The idea of removing as much of the bone as possible without having the nose fall in is a mistake. The less bone removed, the better for the patient. He had seen many patients on whom this had been done, but he could not recall any in whom there was a firm septum. He thinks that usually if the bent portion of the septum above the most prominent ridge of the spur is retained, it is much better for the patient. In very many cases this portion of the septum is nearly half an inch in width; it can be taken out much more easily than it can be retained, but he thinks it better for the patient to leave it. The same principle should apply to the cartilaginous septum. He thinks that usually much more of it has been removed than necessary.

Regarding the author's results from not packing, they seem to have been excellent. Dr. Ingals thinks that packing, in the majority of cases, is a necessary means of safety. If no

opening is made through the mucous membrane on either side except the one directly in front, he has no doubt that clotting will usually, perhaps always, stop the hemorrhage, unless the patient happens to be a bleeder.

Dr. Ingals then stated that he wished to present to the society an efficient and easily removable nasal packing, for, notwithstanding the fact that many patients who have suffered operations in the nares might go to their homes without packing and escape serious hemorrhage, yet in many, bleeding that alarms the patient comes in spite of the packing. In a considerable number, bleeding that is alarming to the surgeon comes on, and in a few fatal hemorrhage has occurred; therefore, he believes that for many reasons careful packing of the naris should be made in most cases after cutting operations on the septum, turbinated bodies, or accessory sinuses. Sometimes packing is required after the removal of mucous polypi, but usually it is not necessary when only a snare has been employed. While in a large number of cases, without packing, no serious hemorrhage would occur after the usual operations, it cannot often be desirable to waste even two to four ounces of blood. General surgeons prevent all bleeding possible, and their reasons for doing so would largely be valid in intranasal surgery; therefore, he cannot think we are justified in subjecting patients to the risk of bleeding. Usually bleeding would not occur for several hours after the operation; then, if the patient had gone home, he would at least be likely to be greatly alarmed. It seems to him unfair to subject the patient to this distress, aside from the first injury resulting from the loss of blood. If there were no other reasons for packing, the peace of mind and comfort of the surgeon make it well worth while.

Often the parts are in such condition that packing is necessary to hold them properly in place.

He has known of several very alarming hemorrhages after intranasal operations, in which the patient's life was saved only by prolonged and persistent treatment, much of it very painful to the patient, and he has known of two or three fatal results. One of these occurred in his own practice, the patient dying from the effects of secondary hemorrhage, although he had stopped the flow thirty-six hours before this sad termination.

The only objections that he can see to packing of the nares after cutting operations are: (1) Obstruction of respiration; (2) pain from pressure; (3) prevention of the escape of pus, and (4) pain from removal.

The obstruction of respiration cannot be considered a real objection, because usually the patient has already become accustomed to this inconvenience, and even if packing were omitted, swelling of the tissues resulting from traumatism would usually stop the naris.

Pain from pressure is a serious objection, if the packing is too firm. The surgeon's experience must guide him to get just the right amount of pressure; and he should make provision against pain by suitable analgesics. He is accustomed to give the patient five or six doses of five grains each of phenacetin, directing one every hour for four or five hours, if required, for pain. At the end of this time, if the pain is still troublesome, or if the patient is nervous, as he is likely to be from the cocain, he gives him half a grain of codein, and has the dose repeated in two or three hours, if needed.

Purulent discharges after operations for infected sinuses will almost necessarily occur, and if the naris is firmly packed the pus may be forced back so as to cause infection of other parts. This danger cannot altogether be avoided, but it should be guarded against by removing the packing as soon as the danger of hemorrhage has passed. Usually the packing may safely be removed within from sixteen to twenty hours.

Pain caused by removal of the packing is by far the most serious objection to its use. To avoid this various methods have been adopted, most of which fall very short of the desired result, as can be appreciated only by those who have themselves suffered from the operation. The same remark would be applicable to the dressing after a large percentage of operations, and he feels that there is no one thing in which surgeons are so remiss as in their failure to prevent suffering at such times.

He has tried many different dressings after intranasal operations, designed to prevent secondary hemorrhage and avoid pain at the time of their removal. The most satisfactory one is made of rubber sponge, the form of which is peculiarly adapted to favor coagulation of blood. It is made

of rubber sponge, preferably about 4 cm. thick, and from 5.5 cm. to 8 cm. long. In preparing the packing the sponge is grasped tightly and compressed between the blades of a long strong forceps, like Pean's hysterectomy forceps, ten inches long, or like the speaker's straight esophageal forceps. The blades are closed tightly as possible, and locked by the catch on the handles. Then the sponge is trimmed off with scissors close to the blades. When the blades are opened, the sponge at once expands, and we have a piece of rubber sponge which should have been cut to about 2 mm. greater in thickness than the extreme width of the naris we wish to pack while the tissues are shrunken down with cocain and epinephrin. The edges of this piece are trimmed down so that it will fill the naris vertically, and when there is fear of hemorrhage far back, the distal portion of the sponge should be left about 2.5 cm. longer, and about 5 to 8 mm. less in height (width). This is done so that this portion, after being pushed through the naris back to the pharyngeal wall, can be drawn forward to plug the choana. For this purpose the whole piece should be about 8 cm. long, whereas if only the naris requires protection, a piece 5.5 cm. in length will be long enough. It is important that this sponge be not too thick, otherwise, in spite of its softness, pain will be caused by the constant pressure that it will exert. The sponge having been fashioned to fit the naris, a strong linen thread is passed through from above downward, about 1.5 cm. back of its proximal end, and the two ends of this thread are tied together, so as to form a loop about 4 cm. long, by which the sponge may be withdrawn. To prevent the sponge from being torn apart in removal, a similar thread is sewn through and through from before backward at the upper and lower part of the packing, and this is tied in front of the thread passed vertically in forming the loop for extraction. Thus prepared, when the loop is pulled upon, all the sponge will have to come with it. When it is desired to plug the choana more carefully, the long piece of rubber is used. A strong thread is passed through the sponge about 4 cm. in front of its posterior end. This is then fastened to the posterior end near one edge, and sewed over and over along the posterior end to near the other edge, when the thread is carried forward and through the sponge at the same distance from the

posterior end as the other end of the thread. The two ends of the thread are then tied together, forming a loop about 7 cm. long, which, when pulled upon, will double the back end of the sponge upon itself and draw it into the choana. When the packing has been made ready, it is rolled up, compressed tightly and immersed, and allowed to expand in a strong solution of formalin. While thus immersed it is alternately compressed and allowed to expand until the solution has permeated every part. It is then allowed to soak in the solution until fully sterilized and then is washed thoroughly in sterile water. It is then ready for use. In introducing this packing it is grasped firmly between the blades of a strong forceps shaped like the ordinary ear forceps, but the blades should be about four inches long, and there should be a catch to hold them together until the surgeon is ready to detach them. The mucous membrane is then smoothed down, and long thin spatulas introduced on both sides of the naris to prevent too much friction as the sponge is crowded in. With the forceps the packing is then pushed back as far as desired, the forceps are released, and the sponge expands to its full size. Something is then placed against the anterior end of the sponge to prevent it from being pulled forward, and the forceps and spatulas are withdrawn. It is usually best to push the sponge back somewhat farther than it is to be left, and later draw it forward to the desired position. A pledget of cotton is then placed in the nostril, and the patient may go home confident that there will be no serious bleeding. If it has been a case where the choana was to be specially packed, while the sponge is held back by something pressed against its anterior end, the longer loop is pulled upon, whereby the posterior end of the sponge is doubled on itself and drawn into the posterior naris.

After fifteen or twenty hours this packing may be withdrawn, often with no pain, and always with much less than caused by other packings that he has tried. When for any reason a large packing has been put in and traction upon the loops for removing it causes pain, the patient may be given a few whiffs of chloroform or some other anesthetic, and then the packing can be pulled out quickly. For this purpose he uses chloroform in the following manner: In the bottom of a two-ounce, wide-mouthed bottle he places a sponge that

will about one-third fill it, and on this pours a dram of chloroform. The patient, holding this in his hand, places the mouth of the bottle between his lips and breathes deeply at the rate of about thirty respirations per minute, until he begins to feel the effects by dizziness or a sense of losing himself. Then the surgeon, who has hold of the loop, pulls the sponge out in about a second, without causing pain. The patient immediately recovers from the chloroform. There is no possible danger from using chloroform in this way, for the patient would drop the bottle before becoming unconscious or taking too great a dose. Holding the bottle in the hand in this way warms the chloroform and assists in its rapid vaporization.

In cases when for any reason he has had reason to fear hemorrhage, he has rubbed on those portions that would come in contact with the wound a powder consisting of quinia urea hydrochlorate, 1 part; acid gallic, 1 part, and acid tannic, 3 parts. This causes a clot firmly adherent to the mucous membrane, and also enmeshed in the rubber, so that withdrawal is apt to cause pain, unless some anesthetic is employed, but it may be pulled out quickly. He thinks that it is seldom necessary to use the astringent powder, and that the patient is more comfortable without it; nevertheless, in those predisposed to hemorrhage he would highly recommend it.

Dr. Otto C. Freer said that Dr. Ostrom's method of operating was simply the well-known Killian operation, with slight modifications. To enter the intricate and distorted anatomy of a septal deflection through a little cut, one-third of an inch long, as Dr. Ostrom did, was to make the submucous resection a blind operation in a field where minute vision is needed to avoid disaster. It is impossible, in deflections at all extensive, to do a thorough resection without an open operative field, and Dr. Freer had removed many bony deflections from patients for whom a submucous resection attempted previously by others had consisted of the cutting out of a piece of cartilage with the swivel knife through a buttonhole cut of the type advised by Dr. Ostrom, the operator, through this inadequate entrance, having been unable to take away the bony part of the deviation, which kept the nostril as much blocked as if nothing had been done.

Dr. Freer did not recognize in Dr. Ostrom's description

of the anatomy of deflections the conditions he had encountered in his resections, and regarded the ignoring of anatomic facts of importance by Dr. Ostrom as proof that the blind mode of operation he had been following had not shown them to him. For instance, he made no reference to the frequent traumatic deflections with two or more separate fragments forming distinct cartilaginous plates of a sharp-angled deflection. A fibrous bridge passes from naris to naris between such fragments, and, by uniting the perichondrial covering of both sides of the septum, makes it impossible to pass the barrier formed by such a bridge without a sharp blade. Dr. Ostrom had advised the elevation of the coverings with a dull elevator moved from behind forward. This elevator would be arrested by the obstacles referred to, nor could it with safety be replaced by a sharp blade, if employed through a buttonhole cut. The dull elevator would also be ineffective in the many cases where inflammatory changes in the mucous membrane of the septum have left broad areas of intimate union between toughened cartilage and thickened perichondrium. These areas are never discovered until the denudation is under way, and sometimes include nearly all of both the convex and concave sides of the deflection. In such cases the denudation is one continuous dissection, and a dull elevator has no place. Dissection, however, requires an open operative field.

Dr. Ostrom does not mention the overlapping of the vomer by the cartilage in the vomerocartilaginous articulation, nor the crossing of the blended periosteum and perichondrium from naris to naris in this articulation, a condition repeatedly described by Dr. Freer, and one which makes dull denudation downward below this articulation impossible.

Dr. Ostrom speaks of the "anterior tip" of the septal cartilage and of the "anterior ridge." There are no such anatomic designations, and it is impossible to tell what Dr. Ostrom meant by them.

In regard to the removal of the bony part of the deflection, as described by Dr. Ostrom, Dr. Freer would have found himself quite helpless with the weak instrumentarium displayed by Dr. Ostrom in the face of the many massive deflections he had encountered. He had often taken away the anterior half of a deflected vomer half an inch thick, and vomeroethmoidal

angles one-third of an inch in thickness. Such solid deflections have to be over- and undercut, as shown in Dr. Freer's last article on the submucous resection in the *Journal of the American Medical Association*, 1912. Unless these bony angles are severed from the perpendicular plate above with punch forceps, the attempt to break them out in the manner described by Dr. Ostrom is dangerous and liable to create fissures in the perpendicular plate which may extend through the sphenoidal sinus to the optic foramen, with resulting blindness in the eye involved, as happened in a case described by Professor Bernhard Fraenkel, of Berlin.

For denuding the incisor crest and anterior part of the vomer, the socalled "ridge," of its periosetum, the delicate scissors shown by Dr. Ostrom seemed peculiarly inappropriate, for these rough bony parts are covered with a periosteum so clinging that they can be shelled out of their covering only by the use of the raspatory designed by Dr. Freer, after the periosteum has been split to the bone with a strong knife. To do this, however, again implies an open operative field, for it cannot be done in the dark.

Dr. Ostrom attributed to the minute cartilaginous remnant of Jacobson's organ an anatomic importance it does not possess. It takes no part in the creation of deflections.

Dr. Ostrom's advice, not to pack after operations upon the septum, is not new. It has often been given in past years by those who like to startle by boldly contradicting the teachings of the experienced, and who advance such advice as progress, while in reality it is retrogressive discarding of what has been learned by the painful experience of the profession. The objection to such advice is that its authoritative tone is apt to mislead the beginners in the specialty into a disregard of common prudence. Why do rhinologists continue to pack, in spite of these innovators? Because neglect to insert the tampon in some case where it did not seem needed, because of absence of bleeding immediately after a submucous resection, was punished by a severe hemorrhage two hours after, when the contractile effect of the cocain and adrenalin upon the vessels had passed away and left them open and paretic. Packing had to be done then under most difficult conditions, with disturbance of the wound and the chance of perforating in a nose full of clots. The severe nosebleeds occurring sponta-

neously from little vessels upon the septum should show how dangerous it is to leave any cut vessel uncompressed in the nose until it has regained its contractility and is effectually closed. Where the buttonhole cut is used there is also danger of bleeding between the coverings of the deflection removed. Several patients operated upon by others through a buttonhole cut have come to Dr. Freer with large hematomas formed in this manner and blocking both nares. In two of these, abscess of the septum occurred. These hematomas could have been prevented by proper packing.

Dr. Freer's layer packing is made of strips of Johnson and Johnson's sterilized lint, cut into strips one-third of an inch wide, with sharp shears, and impregnated with powdered subnitrate of bismuth. The bismuth keeps the tampon aseptic and has been used by Dr. Freer for twelve years. In one case, a bleeding polyp of the septum, he left the tampon in for ten days without its becoming putrid. An iodoform tampon will begin to smell in twenty-four hours. To insert the tampon, the nostril is held open with two of Dr. Freer's septum retractors, one, a long one, being used to guard the site of the operation. A strip is then folded on itself in the middle, stretched taut upon a long dull elevator, and carried back to the posterior naris, when it is tamped down upon the nasal floor. A second strip is inserted in the same manner and placed upon the first. In this way layer after layer of parallel strips are laid in the naris until it is filled to the top. This tampon completely closes the choana by filling the space between the nasal floor and body of the sphenoid bone; it is elastic, and applies itself evenly, without unequal pressure, to all inequalities of the nasal interior. It causes no distress and keeps the flaps in place, and it gives absolute assurance that hemorrhage of moment cannot occur.

The tampon is removed in part in twenty-four hours, those strips being taken out which are in contact with the outer nasal wall or other strips. The strips immediately applied to the wound are left in for a day or two longer, until they have become nonadherent. As the tampon stays perfectly pure, there is no harm in leaving it, especially as the nostril should not be used for breathing for a week at any rate.

No clamp, such as has been advocated of late for the submucous resection to take the place of the tampon, can give the

even, reliable pressure of the latter. Clamps are apt to slip, to press too much or too little, and are about as treacherous as the clamp used to control tonsillar hemorrhage, in respect to assuring a continuous stoppage of bleeding. A patient with a good tampon after a submucous resection does not need to stay in a hospital, but may be sent home—a great advantage, for most of them dislike the idea of a hospital. To leave a patient unpacked in a hospital, with the chance of an interne, inexperienced in nose work, having to pack the furiously bleeding nose of an excited patient, does not seem wisdom to Dr. Freer, as perforations and injury to the wounded parts are liable to occur.

Dr. Derrick T. Vail, of Cincinnati, said that when the submucous operation for removing the cartilaginous septum was first described he came to Chicago in order to see it done and to study the indications for the operation. In his work previous to that time he had never found cases that seemed to require the removal of the cartilage. The most that he did was an Ashe, a Row or a Gleason operation, but after his visit to Chicago he had entirely different ideas regarding the matter, and felt that it certainly was vastly better to remove the cartilage submucously. Moreover, he was convinced that it was a very troublesome and disagreeable thing to have even a bowing of the cartilage, and that the proper thing was to take out every cartilage that was not straight and in the median line. So he began to do this in many cases, and with beautiful results. In time he became convinced that the operation was unnecessary, excepting in certain rather exceptional cases. He still does the operation and likes it very much in these selected cases, but he does it in perhaps only ten per cent of the cases that he did it previously. Not that he had any disagreeable results or experiences with it, but simply because he could not morally feel that he was doing the right thing in subjecting the patient to this operation, excepting in cases of marked deflection, causing or nearly causing atresia.

What better operation is there in the simpler and more common cases, where there is a bowing of cartilaginous septum and some restriction of breathing on one side, or asthmatic symptoms? He uses a small, sharp saw—a Holmes or Pynchon saw—and removes the bony ridge and spur, regardless of the sacrifice of mucous membrane. In conjunction with

this, he always does what he calls a "posterior inferior turbinectomy." He leaves the anterior part of the turbinate body alone, because he feels that under climatic influences it has a great deal to do with the physiology of the nose in a protective sense. But he saws off the entire posterior part of the inferior turbinate, to which is always attached in these cases a mulberry-like hypertrophy, the socalled "posterior hypertrophy." At the same time he snares off through the nose the mass of adenoids that almost invariably exists, not so much in the vault of the pharynx as in a vertical mass down the sides of the pharyngeal wall, like an exaggerated fold. This adenoid fold exists there because the serration has been faulty, and to remove it he passes the wire snare back through the nose until the end of the canula of the snare impinges on the basilar process of the occipital bone, the wire loop descending on the posterior wall of the pharynx, and then, engaging the adenoid mass in the loop of the snare by drawing the wire slowly home, it is snared off. This operation gives the patient a good nose—better, in his judgment, than the best submucous operation in these cases. He has not seen this method described by any rhinologist, and considers it a valuable one.

Regarding nasal packing after a submucous resection of the septal cartilage, he has tried the sponge packing, as described by Dr. Ingals, but not with the same fine technic, which he admires. But in his hands it was entirely inadequate. He found it so because he could not get an equal distribution of pressure over the operative field. He believes in packing, not because of the danger of hemorrhage, but for an entirely different purpose—a purpose which was not mentioned by the essayist, namely, in order to have perfect approximation of the bases of the perichondrium of the two sides. He always packs the narrow side of the nares only, that side in which the breathing space was restricted, and he uses ordinary loose mesh sterile gauze, previously cut in long strips and rolled like a little bandage. He always keeps a number of them on hand, all sterilized and kept in a glass jar ready for use. The gauze roll is moistened before using, which contributes to neat packing. Ordinary packing forceps are used. He packs only the side of septum convexity; he does not pack both sides, for fear of sloughing. The parts

have already been wounded, and there is a certain amount of thrombosis of some of the septal veins, and if the nares were packed too tightly on both sides, necrosis might result. The packing is left in place only for twenty-four hours.

He quite agreed with the essayist in his ideas, which were progressive. The day of packing and leaving it in for as long as four days is past.

Regarding hemorrhage in submucous cartilage resection, he has never had much experience with it. There are no blood vessels cut, if the dissection has been properly done. Someone spoke of "delayed hemorrhage"—hemorrhage that occurs a week or ten days after operation. What does delayed hemorrhage mean? Delayed or secondary hemorrhage means wound sepsis, and nothing else.

Dr. A. M. Corwin said he was entirely open-minded with regard to the statement that an extensive septal operation, such as this is at times, can be done without packing, but on that point he was from Missouri. He had no reason to doubt the doctor's statements as to his results, but his own experience has been in accord with Dr. Freer's, that hemorrhage does occur occasionally, and for this packing is indicated. Furthermore, we operate on no other part of the body practically without dressing the wound, and we see no reason why we should make an extensive opening in the mucous membrane, cut away bone and cartilage, producing two loose flaps of membrane and perichondrium, and leave the wound unprotected against infection. The only case of abscess of the septum following resecting that he had ever seen after his own operating was in the case of a patient, entirely normal, with a perfectly clean nose, packed, and everything normal, who became nervous and dragged away the packing and left the wound open. An abscess of the septum developed at the site of the resection, and greatly increased her suffering and the danger and delay in healing. Moreover, there is no harm in packing, if done properly, while hemorrhage and infection may occur without it; therefore, the argument is in favor of packing.

He has found in the past few years that the use of a little gauze roller bandage and camphorated vaselin has been very satisfactory for this purpose. He cuts these strips of gauze, which are one-quarter inch wide, into two or three inch

lengths, and boils them in the vaselin in a small crucible at the time of operation. This is cooled off by the time the operation is finished. These little pieces of gauze thus saturated are then packed carefully into the nose, one of them having been spread over the septal wound. These are left in practically until the second day. Then two or three pieces are removed. Each day following a few pieces are taken out at a time. There is no pain at all from removing them. This seems to him a very good way of packing, as he can take out what he wants and leave what he wants, without dragging upon long, unmanageable strips. The speaker believes that any man who does a radical operation on an inferior turbinate and does not pack, is almost certain to have hemorrhage, often profuse, sometimes serious, and he understood the writer to say that he employs little or no packing in such cases.

There were many points he would like to go into, but believed that we should accentuate the proposition that we should treat a nasal wound as far as possible in an aseptic manner. This involves proper protection by packing. We know that the larger the opening made, whether by incision or incidental tearing, the more need there is of packing.

To limit the discussion tonight to this one point of to pack or not to pack is unfortunate, since the subject matter of the paper has comparatively little to do with this point, notwithstanding the title, but is a lengthy dissertation on the technic of operating, and many interesting points touched upon by the essayist should be discussed, favorably or otherwise.

Dr. Edwin Pynchon said that while the essayist had very modestly disclaimed any credit for bringing anything new before the members, he must acknowledge that he had brought forth some ideas that were worthy of mention that had not been elsewhere brought out, and he wished to particularly speak of the use of the blunt pointed tenotomy shears.

Regarding packing, he has found that the method advocated by Dr. Freer is the most practical. However, in place of bismuth he likes to medicate it with a vaselin preparation containing antiseptics. One of the features to consider in packing the nose is that at the time of operation, owing to the use of cocain, the outer wall is very much contracted, and of course afterwards becomes congested, so for that reason it may make too much pressure. One of the great ob-

jects is mechanically to hold the two opposing surfaces together, and the more perfectly they are put in apposition, the more surely they will heal and thus avoid the formation of hematoma which can otherwise organize and cause ultimate thickening of the septum, while it was designed through the operation to cause the septum to be as thin as possible. So, consequently, he is in favor of packing both nostrils.

Regarding the removal of the packing, as Dr. Freer suggests, he is in the habit of taking out half of the upper part in both nostrils the day after the operation; then, maybe on the second day, all of the packing on the side that was concave, and on the third day the remainder of the packing. Prior to using these strips he used Bernays-Simpson tampons, but it is easy to see, from a mechanical standpoint, how impossible it is to make accurate apposition of the perichondria by the use of a device of that kind, which swells unequally (two from the same box will swell differently), and may thus produce too much pressure. Another thing: The tampon, introduced in any way, cannot cover as much area as has been separated, so consequently above or back of the tampon hematoma may occur, and any thickening of the septum is detrimental in the way of interfering with the breadthway in the upper part of the nose.

Dr. George E. Shambaugh stated that he had learned in the early days of his practice that it was not a safe procedure to do even the simpler operations in the nose and allow the patient to go home without packing, especially in a city the size of Chicago, where it often requires several hours before a patient can be reached. Both on account of the discomfort to the patient in having the nose packed, and because of the long trip from the office to the patient's home, Dr. Shambaugh has in recent years performed almost all of even the simpler operations of the nose at the hospital, where the patient is allowed to remain over night. He is not in the habit of packing the nose under these circumstances, for if a patient remains quiet in bed, the chances of a hemorrhage are much less than if he attempts to make a long trip to his home after the operation. If a hemorrhage should occur, the interne at the hospital can pack the nose, if necessary. As a matter of fact, Dr. Shambaugh can recall but one case where a patient left in this way had to have the nose packed by the interne; this

was a case where nasal polypi and part of the ethmoid bone were removed.

In his operations on the septum he has always been in the habit of packing the nose. The packing in one side is removed at the end of twenty-four hours, and the other at the end of forty-eight hours. He places a piece of paraffin on the side of the septum where the mucous membrane has been incised, which facilitates very much the removal of the packing from this side.

The point which Dr. Vail wished to emphasize, that secondary hemorrhage always means sepsis, Dr. Shambaugh is not willing to accept. He stated that while it is true that sepsis is often the cause of secondary hemorrhages, it does not follow that all secondary hemorrhages are the result of sepsis. In most of the cases of secondary hemorrhages which he has seen develop in cases where the tonsils had been removed, the hemorrhage took place usually from five to ten days after the operation. In not a single one of these cases has he been able to recognize anything which he would class as sepsis, and in none of these cases was the local reaction at all marked. In a case of severe secondary hemorrhage from an operation in the nose, the bleeding was accounted for by a high blood pressure, and there was no evidence at all of infection in the nose.

Dr. Otis H. Maclay said he had enjoyed the paper and discussion, and especially the conservative remarks with referenec to septal work. It has always been his desire to so do his septal work that he could leave as much as possible of the septum, endeavoring only to get a functionating nose.

Regarding packing, he has always used packing, leaving it in originally for forty-eight hours. He has never had any sepsis, so far as he knows. For the last six months he has been taking out the packing, as a rule, in twenty-four hours. He has never had any hemorrhage that he has known of. There has always been some oozing and bleeding in all his operations. Whether without packing that would have been present or not, he does not know, but he has always felt safer when it has been used. He has packed less firmly in the last six months than before that time, but the packing, although it has allowed perhaps a little more oozing, has always been

sufficient to control any bleeding that has occurred, but he has never felt perfectly justified in leaving it all out.

It is a matter of progress to hear this paper. Perhaps it is the proper course, and we may all gradually work into it. At least, the method should be carefully considered before being accepted or condemned. The papers read before the society and the discussions represent the best efforts in this line, and although the society should be progressive, it is equally important that we should be conservative in the methods employed, since the work recognized in the society is considered the proper and safe course to pursue, and doubtless is adopted by others on that basis.

Dr. J. Z. Bergeron thinks that the principal reason for not packing is largely, if not absolutely, to lessen the patient's discomfort caused by the packing. For the last five or six months he has used the strip packing described by Dr. Freer, one layer on top of another, surrounded by a layer of gutta percha, and on removing it, after twenty-four or thirty-six hours, he has found that it caused absolutely no pain.

Dr. Edwin Pynchon said it had always occurred to him that in the use of the packing Dr. Freer advises, getting it in a piece and cutting off a strip about one-quarter or three-eighths inch in width, it is naturally irregular in shape, and if it is not cut in the right direction it breaks easily. It has seemed to him that some manufacturer should put this material on the market in strips with a selvage edge. He has never been able to find it.

Dr. Joseph C. Beck has, within the last three months, done quite a few submucous resections without packing. He would not say that he had left the nose without anything, but he had used no material such as gauze. He considers that the stoppage of the primary hemorrhage is very essential, and while he has the flaps open he packs the gauze firmly between them and allows it to remain in there from three to five minutes. Then, after removing it, he watches for a minute or two, until he believes that the hemorrhage has stopped. Of course, if the arteries that come from the palate to the nose are cut, they might possibly start another hemorrhage, but five minutes' waiting is sufficient time. When he is sure that the hemorrhage has stopped, he brings the parts together as firmly

as possible, holds them and introduces the wedge-shaped metal spring, as recommended by Brüning, he believed.

Dr. Beck agrees with Dr. Shambaugh. He has not packed a nose after an inferior turbinate operation since he can remember, and has had no occasion to regret it.

He used the spring referred to above in ten successive cases, with good results. Then he had a case where a hematoma followed, the pain radiating to the face, with slight temperature. But he would not stop using the spring on account of this one case. Previous to using the spring, he used the packing referred to by Dr. Bergeron, which he (Dr. Beck) devised for that purpose, and had no occasion to regret it, except the discomfort occasioned to the patient.

Dr. Robert Sonnenschein answered Dr. Pynchon's question regarding his inability to obtain gauze with a selvage on both sides. It is used very extensively in Europe. Mr. V. Mueller carries it, and it can be obtained in the sizes of three-eighths and one-half inch.

Dr. Louis Ostrom, in closing, said that the members were behind the times if they packed. He has not packed for five years. They would not discontinue packing in Europe almost exclusively after submucous resection unless it was a good procedure. In the later books—St. Clair Thompson's and Parker's—published this year—no packing is advocated. Killian does not pack. Packing is not essential. He cited a case in which temperature had followed the operation, and after three days of this condition, with pain radiating to the face, he inserted a knife, expecting to see pus, but instead found only clear serum. He had a case of a hemophiliac in whom the blood dripped out like water, in which he packed. He gave five packages of antitoxin, and within an hour afterward had clotting. The packing was removed the next morning, and in about four hours afterward the nose was swelled just as tight as if there had been a packing there. He had tried out the methods of packing referred to over and over again, and has had nothing but trouble from them. When he has bleeding he packs, but is not going to pack until there is bleeding. He keeps his patients under control so that they are right beside him.

Regarding perforations, we must remember that our work today must not be classed with that done three or four years

ago. Dr. Freer said he had had perforations by accident. Dr. Ostrom has had them, but they were due to carelessness, or things that were beyond his control. But in those conditions it was simply a puncture, just as though made for drainage purposes.

He has never heard of the wire springs, referred to by Dr. Beck, but is going to get some.

Regarding his use of the expression, anterior tip, it was simply a doubling up of language. He meant simply the tip or anterior end of the septum.

All the points brought out by Dr. Freer are covered in the paper, which the essayist did not have time to read in full. The paper deals only with the technic, not with the pathology, but every form of deflection is considered, and cases cited to explain the technic.